

R E P O R T

# VAPOR INTRUSION DATA VALIDATION

Sauget Area 2  
Sauget, Illinois

*Prepared for*

U. S. Environmental Protection Agency, Region 5  
77W. Jackson Blvd. (SR-6J)  
Chicago, IL 60604-3590

September 4, 2008



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**Project #21561683**

# Sauget Area 2 Sites Group

September 4, 2008

Ms. Leah Evison  
U. S. Environmental Protection Agency, Region 5  
77W. Jackson Blvd. (SR-6J)  
Chicago, IL 60604-3590

**Re: Sauget Area 2 - Sauget, Illinois**

Dear Leah:

Attached is our Vapor Intrusion Investigation Data Validation Report for the Sauget Area 2 Sites.

Please call us with any comments or questions on this report.

Sincerely,

*Gary Uphoff.*  
*By, S.D. Smith*

Gary D. Uphoff  
Co-Project Coordinator



Steven D. Smith  
Co-Project Coordinator

GDU/SDS

cc: Distribution List Attached

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# GLOSSARY OF ACRONYMS AND ABBREVIATIONS

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|        |  |
|--------|--|
| CV     | Calibration Verification   |
| CLP    | Contract Laboratory Program  |
| CM     | Corrective Measures  |
| COC    | Chain of Custody   |
| DQO    | Data Quality Objective   |
| GC/MS  | Gas Chromatography/Mass Spectrometry   |
| ICV    | Initial Calibration Verification   |
| ID     | Identification   |
| IEPA   | Illinois Environmental Protection Agency   |
| J      | Estimated Value  |
| LCS    | Laboratory Control Sample  |
| MDL    | Method Detection Limit   |
| MS/MSD | Matrix Spike/Matrix Spike Duplicate  |
| ND     | Non-detect   |
| %D     | Percent Difference   |
| %R     | Percent Recovery   |
| %RSD   | Percent Relative Standard Deviation  |
| PARCCS | Precision, Accuracy, Representativeness, Completeness, Comparability and Sensitivity |
| QA/QC  | Quality Assurance/Quality Control  |
| QAPP   | Quality Assurance Project Plan   |
| QCSR   | Quality Control Summary Report   |
| r      | Correlation coefficient  |
| R      | Rejected value   |
| RF     | Response Factor  |
| RL     | Reporting Limit  |
| RPD    | Relative Percent Difference  |
| SA2SG  | Sauget Area 2 Sites Group  |
| SDG    | Sample Delivery Group  |
| SIM    | Selected ion monitoring  |
| SOP    | Standard Operating Procedure   |
| TCD    | Thermal Conductivity Detection   |
| U      | Non-detect Value (under the MDL)   |
| UJ     | Estimated Non-detect (under the MDL)   |
| URS    | URS Corporation  |
| USACE  | U.S. Army Corps of Engineers   |
| USEPA  | U.S. Environmental Protection Agency   |
| VOCs   | Volatile Organic Compound  |
| WP     | Work Plan  |

The purpose of this investigation was to collect air samples to evaluate the soil gas vapor intrusion pathway as part of a Supplemental Investigation conducted at the Sauget Area 2 Sites in Illinois. This Validation Report discusses the laboratory analyses of air samples performed by Air Toxics LTD, of Folsom California. The field investigation was conducted by URS Corporation (URS). Field quality control activities such as sample verification that could have affected the data are also addressed. The data usability is assessed in this Report in support of additional data characterization for the site.

## 1.1 PROJECT DESCRIPTION

The existing soil data within the Sauget Area 2 Sites appears to be inadequate to use for a vapor intrusion evaluation. Based upon an evaluation of the potential alternatives to evaluate the vapor intrusion pathway, URS conducted a soil gas investigation in the vicinity of buildings near or within the boundaries of the Sauget Area 2 Sites. This investigation provided soil gas concentrations that were be used in the evaluation of vapor intrusion into buildings as part of the Human Health Risk Assessment for the Sauget Area 2 Sites. The investigation followed the procedures detailed in the *Sauget Area 1 Soil Vapor Intrusion Investigation Work Plan*, dated February 28, 2007. The samples collected as part of this investigation is listed in Table 1-1 of this report.

## 1.2 OVERALL PROJECT OBJECTIVES

The objective of the sampling was to provide soil gas concentrations that were used in the evaluation of vapor intrusion into buildings as part of the Human Health Risk Assessment for the Sauget Area 2 Sites.

## 2.1 QUALITY CONTROL ACTIVITIES

Document review activities took place prior to and concurrent with the field program implementation. Communication with the project manager clarified and confirmed the proposed sampling activities when conflicting information was encountered in the work plan document. The review and continuous communication assured that the samples collected during this program would meet prescribed project guidelines and satisfy the project data quality objectives (DQOs). Documentation of sampling activities and sample shipment chain-of-custody (COC) records were designed to confirm that all proposed investigation activities were completed as planned. Copies of the COC forms are presented in Appendix B of this report.

### 2.1.1 Document Review

Prior to the startup of field activities, the Soil Gas Investigation WP, the Quality Assurance Project Plan (QAPP), and the Health and Safety Plan were provided to the members of the field sampling teams for their review. This familiarized them with the site being investigated, the objectives of the investigation, and the SOPs under which the field activities were to be completed. Field personnel were briefed on the work to be completed prior to project startup. Coordination of the field sampling activities was maintained through open communication among project management personnel, the field sampling teams, and the analytical laboratories.

### 2.1.2 Equipment Decontamination

The equipment decontamination was completed by the laboratory. The 6 or 1-Liter Summa canisters were batch certified by the laboratory before being sent to the work site. Equipment decontamination was not required by the URS field personnel.

### 2.1.3 Sample Verification

During field activities, the field sampling team reviewed the QAPP to verify the sample collection requirements for each sampling location. The review included the verification of target analytes, sample container requirements and the quality assurance/quality control (QA/QC) sampling requirements. Information concerning the number and type of samples collected at each location was documented as identified in Section 2.2.2. Any questions or inconsistencies that arose during the field activities were directed to the URS Project Manager for resolution.

### 2.1.4 Field Equipment Calibration

Field equipment did not require calibration.

## 2.2 SAMPLE COLLECTION ACTIVITIES

Samples were collected for chemical analyses during the investigation in accordance with the field sampling procedures summarized in the Soil Gas Investigation WP. The samples were collected at the Sauget Area 2 Sites from September to October 2007. Table 1-1 of this Quality Summary Control Report (QSCR) summarizes the samples collected and includes sample identification, sampling date and time, sample matrix, and parameters analyzed for each sample.

Samples were submitted to Air Toxics, LTD in Folsom, California for all parameters.

### 2.2.1 Sample Containers, Handling, and Labeling

The samples were collected in certified pre-cleaned Summa canisters, sealed, and affixed with a canister sample label in accordance with the Sample Handling Procedures listed in SOP No. 25 (Sample Containers, Preservation and Holding Times). Samples were placed the box provided by the laboratory, and sample custody was maintained until shipment to the laboratory. Sample labels included the sample identification number, and the sample collection date and time as specified in Section 5 of the QAPP.

Sample information, such as identification numbers, targeted analytes, sampling times, and QA/QC sample types, was documented on COC forms for shipment to the analytical laboratory. Completed COC forms were signed and one copy of the completed COC form was removed and retained for the field and office files. URS St. Louis put the Summa canisters in the box provided by the laboratory, sealed the box, and shipped them via overnight delivery service to Air Toxics, LTD.

The analytical laboratories and URS were in contact regularly regarding the number and type of samples shipped. These conversations also allowed for the expedient resolution of any questions or discrepancies arising from previous sample shipments.

### 2.2.2 Documentation of Field Activities

Field logbooks were completed for the documentation of the field activities. All field activities and samples collected were documented in the field logbooks. Sample collection was also documented on the COCs.

### 2.2.3 Sample Designation

Samples collected during the Supplemental Investigation were labeled with unique sample identification as summarized in Section 4 of the QAPP. There was no transcription errors associated with the samples collected.

### 2.2.4 Field QA/QC Samples

QA/QC activities in the field included the collection of field blanks and duplicate sample pairs. The following sections detail the field QA/QC samples collected.

#### 2.2.4.1 Field Duplicate Samples

Field duplicate samples were collected and submitted for analysis at an approximate ten percent frequency. Field duplicates were collected following the same procedures as the original samples. The field duplicates were submitted to Air Toxics, LTD as routine analytical samples.

Field duplicate results provided estimates for overall precision of sample collection, field sample preparation, and laboratory analysis. The duplicate sample data was used to assess the usability of the sample data. Field duplicates are identified in Table 2-1. The results of the field duplicate samples are discussed in the data reviews summarized in Appendix C of this Validation Report.

#### Field Blanks

Field blanks were collected and submitted to the laboratory with the investigative samples and analyzed for the same parameters as the investigative samples. Field blanks were collected from a certified air source in the field. Field blanks were analyzed to check for procedural contamination at the site which may have caused sample contamination.

### 3.1 SAMPLE DOCUMENTATION

Documentation of sample tracking is an important aspect of environmental investigations and is designed to maintain the sample integrity subsequent to sample collection.

The URS field crews were responsible for completing COC forms which described the sample identification, time of collection, sample matrix, analyses requested, preservatives (if required), and any additional comments. The COCs were placed in the boxes shipped to the laboratory. Upon receipt of the boxes, the laboratory reviewed each box and accompanying COCs. Copies of the completed COCs are presented in Appendix B.

The laboratory sent URS sample confirmations via e-mail. Some minor discrepancies were noted during the sample receipt. These issues were addressed immediately with the field manager and were corrected prior to the submittal of the data package. URS was contacted regarding an anomaly for samples received September 24, 2007. The “relinquished by” portion of the COC was not signed by URS before samples were shipped to the laboratory. All samples were received by the laboratory in good condition. No additional problems or discrepancies were noted. All issues listed above were resolved prior to analysis and did not impact project DQOs.

#### 4.1 LABORATORY PROCEDURES

The samples collected during the Supplemental Investigation were analyzed following USEPA methods as summarized below. The associated QC review and data validation summaries are provided in Appendix C, respectively. The laboratory provided, in various batches, documentation for the methods listed below, including sample preparation, sample tracking, and documentation controls.

The data reported by the laboratory were reviewed and qualified accordingly. The qualifiers assigned are listed in Table 4-1.

##### 4.1.1 Volatile Organics

VOC soil gas analysis was prepared and analyzed by USEPA Methods TO-15 and TO-15 selected ion monitoring (SIM). Method TO-15 utilizes gas chromatography/mass spectrometry (GC/MS) for separation and detection, respectively.

##### 4.1.2 Oxygen

Modified ASTM Method D1946 is a gas chromatography/thermal conductivity detection (GC/TCD) method that was used for determining the chemical composition of reformed gases and gaseous mixtures. Samples were prepared and analyzed by following Modified ASTM Method D1946.

#### 4.2 LABORATORY QA/QC SAMPLES

##### 4.2.1 Method Blank

The method blank for the analysis consisted of is an unused, certified canister that has not left the laboratory. The blank canister was pressurized with humidified, ultra-pure zero air and carried through the same analytical procedure as the field sample. The blank was carried through each step of the analytical method to analysis. The method blank data were used to evaluate potential contamination contributed to sample preparation and analysis during normal laboratory operations.

##### 4.2.2 Surrogate Spikes

Surrogate spikes are compounds added to every blank, sample, laboratory control sample, and standard when specified in the analytical methodology. The results are utilized to evaluate the accuracy of analytical measurements on a sample-specific basis. Surrogates are generally brominated, fluorinated, or isotopically labeled compounds not expected to be present in

environmental media. Results are expressed as percent recovery (%R) of the surrogate spike. Recoveries outside of criteria can indicate evidence of matrix interference or problems with internal standards.

#### 4.2.3 Laboratory Control Samples

Laboratory control samples (LCS) are well-characterized, laboratory-generated samples and are used to monitor the laboratory's day-to-day performance of analytical methods. The organics LCS limits are based on  $\pm$  three sigma and are updated every six months. LCSs are used to monitor the precision and accuracy of the analytical process independent of matrix effects. In some instances, the LCS is used to identify any background interference or contamination of the analytical system, which may lead to the reporting of elevated concentration levels or false positive results. The results of the LCS are compared to well-defined evaluation criteria to determine whether the laboratory system is "in control." Controlling laboratory operations with LCS, rather than surrogates or matrix spike/matrix spike duplicate (MS/MSD), offers the advantage of being able to differentiate low recoveries due to procedural errors from those due to matrix effects.

#### 5.2.3 Internal Standards Performance

Internal standards, which are compounds not found in environmental samples, are spiked into blanks, samples, and LCSs. The internal standards are spiked into the GC trap at the collection time. Internal standards are used as a reference for calibration and for controlling the precision and bias of the analytical method. Internal standards must meet retention time and performance criteria specified in the analytical method or the sample would have been reanalyzed.



The data review process, which involved a review of the laboratory summary data, was implemented to assess the quality of data resulting from the field sampling program with respect to the quality assurance objectives established for the project. In order to evaluate the appropriate usage of the data, in supporting decisions to be made, the data was evaluated with respect to data quality, major data uses, and the remedial decision to be made. Data that did not meet the criteria were qualified or discussed for the limitation on usability. In addition, approximately 10 percent of the data underwent a more comprehensive evaluation which included the review of raw data (i.e., chromatograms, run logs, etc.), recalculation of data, and sample tracking. For the purpose of this document, this extended review was termed full validation.

The following sections summarize the data review and data validation approach used for the Sauget A2 samples. In general, the review and validation followed guidance as presented in USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (USEPA 1999), as applicable to USEPA analytical methods and method-specific criteria. As indicated above, the data review involved reviewing QC summary forms, whereas the validation additionally involved the review of raw data. Table 3.1 of the Sauget A2 QAPP (URS 2004) summarizes the data review/validation criteria in tabular format.

## 5.1 DATA REVIEW/VALIDATION ELEMENTS

Analytical laboratory results were reviewed following guidance presented in USEPA CLP National Functional Guidelines for Organic Data Review (USEPA 1999). The data were reviewed/validated using the QC criteria specified in the Sauget A2 QAPP (URS 2004). These guidelines were used as applicable to USEPA methods. Method-specific and established laboratory criteria were used for data assessment. Based on results of the data review/validation processes, sample data may have been qualified as **J** (estimated), **UJ** (estimated non-detect), or **U** (non-detect).

Although the data packages provided were not CLP deliverables, the CLP guidance was followed where applicable to USEPA methodology. The QC elements reviewed in laboratory analytical data packages included the following:

- Completeness of the data package
- Laboratory case narrative and log-in receipt forms
- Compliance with required holding times

- Presence of analytes in method blanks and field blanks
- Results of LCS
- Recoveries of surrogate spikes in samples
- Recoveries of internal standards
- Field duplicate samples
- Laboratory duplicate samples

The data validation included all of the items identified above and additionally included the items below:

- Instrument performance check samples
- Run logs review
- Chromatograms review
- Initial calibration
- Calibration verifications (CV)
- Retention time windows
- Analytical result verification

When a result was above the method detection limit (MDL) and below the reporting limit, the laboratory flagged data **J** to indicate that the concentration reported is an estimated value. The data, including all post-analysis qualifiers, are presented in the data summary tables in Appendix A. The data review and validation results are presented in Appendix C.

The data review and validation procedures used to evaluate the Sauget A2 data are described in this section. The QC review details quality control issues associated with the analysis of the samples, describes if the data required qualification.

#### 5.1.1 Completeness of Data Package

Data packages were reviewed to make certain that they contained the data contractually required in the deliverable. This included checking the data package for the results of each analyte requested on each field sample submitted in the analytical batch, along with the requested QC documentation for the respective methods.

#### 5.2.4 Sample Preservation and Holding Times

Sample holding times were calculated by subtracting the date of sampling, as determined from the COC forms, from the date of sample analysis. If the sample analysis was completed outside of the required holding times, data was qualified as estimated **J** (detects) or **UJ** (nondetects), or rejected **R**, depending on the severity of the exceeded holding time. The validation additionally included reviewing run logs and chromatograms to ensure the dates presented on the summary forms were accurate.

#### 5.1.3 Blanks

Guidance provided in the USEPA CLP National Functional Guidelines for Organic Review was used for the evaluation of method blanks and field blanks. If analytes were detected in a blank sample, but not in samples associated with the blank sample, then data was not qualified. If analytes were reported in a blank and in associated samples, the following actions were taken:

- Positive sample results were reported without qualification when the concentration of the analyte in the sample exceeded 10 times (10x) the amount in a blank for common laboratory contaminants (methylene chloride, acetone, 2-butanone), or exceeded 5 times (5x) the amount in a blank for other compounds. Note: The 10x rule was only applied to method blank samples.
- When the sample results were greater than the reporting limit (RL), but less than the required multiple (5x or 10x) of the method blank result, sample results were qualified as non-detect **U**, and the RL was raised to the sample concentration.
- When the sample results were less than the RLs and less than the required multiple of the method blank result, sample results were qualified as non-detect **U** at the RL.

During the data validation, the chromatograms were reviewed to ensure all peaks were identified and explained. In addition, run logs were reviewed to ensure a method or preparation blank was analyzed with each batch.

#### 5.1.4 Surrogates

Surrogates were used to assess accuracy for TO-15 and TO-15 SIM, analyses on a sample specific basis. Criteria for recovery of surrogate compounds spiked into samples are provided in Table 3.3 of the QAPP (URS 2004). For TO-15 and TO-15 SIM analyses, if any surrogate was out of specification due to recoveries greater than the upper evaluation limit, indicating a high bias, positive results for that sample were qualified as estimated **J**, and non-detect data were not qualified. If recoveries were below the lower evaluation limit, indicating a low bias, but greater

than 10 percent, positive results for that sample were qualified as estimated **J**, and non-detect results were qualified as estimated **UJ**. For any surrogate recovery below 10 percent, positive results for that sample were qualified as estimated **J**, and non-detect results were qualified as rejected **R**.

The validation additionally included recalculating the surrogate values from the raw data and reviewing the chromatograms to ensure the surrogate compounds were within the established retention time windows.

#### 5.1.5 Laboratory Control Samples

LCS is well characterized, laboratory-generated samples used to monitor the laboratory's day-to-day performance for organic analyses, and to assess the accuracy and precision of the analytical process independent of matrix effects. Evaluation criteria for LCS are provided in Appendix A of the QAPP (URS 2004). Sample results associated with a LCS recovery below the evaluation limit were qualified as estimated **J** (detects) or **UJ** (nondetects) based on a potential low bias. If LCS recoveries were less than half the lower evaluation limit, sample results reported as non-detect were qualified rejected **R**. Detected sample results associated with a LCS recovery above the evaluation limit were qualified as estimated **J** based on a potential high bias. Data reported as non-detect were not qualified based on a LCS with potential high bias.

The validation additionally included reviewing extraction and run logs to ensure a LCS was analyzed with each batch. Approximately 10 percent of the LCS recoveries were recalculated using the raw data. In addition, chromatograms were reviewed to ensure the LCS compounds were within the retention time windows.

#### 5.1.6 Field Duplicate Samples

Field duplicate samples were collected at a frequency of approximately 10 percent, as required by the Sauget A2 QAPP (URS 2004). Relative percent differences (RPDs) were calculated for each field duplicate pair. Precision evaluation criteria of 25 percent RPD for soil gas samples were considered if the analyte concentrations were greater than 5x the RL for both samples. For analytical results less than 5x the RL, for either or both samples, RPD evaluation criteria of  $\pm 2x$  the RL were utilized. Duplicate results were evaluated on a case-by-case basis to determine if qualification of data was necessary. Where it was determined that qualification of field duplicate samples was required, associated data were qualified **J** (detects) or **UJ** (nondetects).

**5.1.7 Instrument Performance Check (Data Validation Only)**

The laboratory was required to analyze an instrument performance check sample every 12 hours of sample analysis. The instrument performance check sample summaries were compared to the method criteria. In addition, approximately 20 percent of the values were recalculated from the raw data. The laboratory was required to meet the method criteria prior to analyzing samples. If the laboratory did not meet the tuning criteria, the associated samples were qualified as **R**.

**5.1.8 Run Log Review (Data Validation Only)**

Review of the run logs involved reviewing the logs to determine that samples were analyzed as presented on the sample summary forms. The sample run logs were reviewed to determine that the correct sample volume was prepared, the appropriate QC samples (e.g., LCS...) were analyzed as part of the analytical batch, and the samples were analyzed in the method-required order.

**5.1.9 Chromatogram Review (Data Validation Only)**

This involved a review of each chromatogram to determine that peaks were within the acceptable retention time windows of the associated standard. The review also included comparing the analysis times presented on the instrument run logs to those presented on the sample chromatograms. In addition, the review identified all peaks present on the chromatogram as either: target analytes, internal standards, surrogates, or tentatively identified compounds.

**5.1.10 Initial Calibration (Data Validation Only)**

Each method required establishing an initial calibration curve. The data validation involved reviewing the percent relative standard deviations (%RSDs), the response factors (RFs) or the correlation coefficient  $R^2$  if linear regression was employed. If %RSDs, RFs, or correlation coefficient  $R^2$  were not met for an analyte, the associated data was qualified as **J**, **UJ**, or **R**, depending on the severity of the outlying data point. One analyte per internal standard was recalculated using the raw data.

**5.1.11 Calibration Verification (Data Validation Only)**

Each method required the analysis of CV samples to ensure the initial calibration was still valid. The data validation involved reviewing the percent difference (%D) of the RFs between the CV and the associated calibration curve. If the RF or %D criteria were not met for an analyte, the associated data was qualified as **J**, **UJ**, or **R**, depending on the severity of the outlying data. One

analyte per internal standard, or 10 percent of the data presented on the continuing calibration summary forms, were recalculated using the raw data.

## 5.2 MEASUREMENT OF QUALITY ASSURANCE OBJECTIVES

The measurement of quality assurance was determined by the assessment of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). The PARCCS definitions are included below and the PARCCS assessments are included in Section 8.

### 5.2.1 Precision

Precision is the measure of variability between individual sample measurements under prescribed conditions. Replicate measurements of known standards and the analysis of duplicate environmental samples assess precision. Evaluating the RPDs obtained from results of laboratory duplicate, and field duplicate samples assessed precision. The precision of the data is discussed in Section 8.

### 5.2.5 Accuracy

Accuracy is the degree of agreement between the measurement of a known sample and an accepted reference or true value. Evaluating %Rs for LCS samples, and surrogates assessed accuracy. The accuracy of the data is discussed in Section 8.

### 5.2.6 Completeness

Following the QC review and validation of the data packages for the site, the data were assessed with respect to the fulfillment of QA objectives and usability. The completeness for laboratory analytical data for the site was calculated by the ratio of acceptable (including estimated data) analyses requested on the samples submitted for analysis, to the total number of analytical results requested.

$$\% \text{Complete} = \frac{\text{Number of Valid Analytical Results (including estimated J results)}}{\text{Total Number of Analytical Results Requested}}$$

The percent completeness, with respect to overall project objectives for the Sauget A2 project, was evaluated for the data required in making decisions on a case-by-case basis. In general, samples critical to the decision process required a 95 percent completeness goal.

#### 5.2.4 Representativeness

Representativeness is the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a parameter primarily concerned with the proper design of the sampling program (such as sampling location strategy) or sub-sampling of a given sample. Assessment of representativeness includes an evaluation of precision. Therefore, reviewing the precision of field duplicate samples collected from a site can assess representativeness of the analytical results, with respect to the medium sampled. Review criteria for field duplicate analyses are identified in Section 5.1.7.

#### 5.2.5 Comparability

Comparability expresses qualitatively the confidence with which one data set can be compared to another. Data are comparable when collection techniques, measurement procedures, methods, and reporting are equivalent for all samples within the sample set. Section 8 contains a qualitative assessment of data comparability.

#### 5.3.1 Sensitivity

Sensitivity broadly describes the RL established to meet the project-specific DQOs. The sample RL is the lowest concentration of an analyte present in a sample that can be quantified with a specified level of confidence. The RLs are a function of the sample characteristics, MDLs, and laboratory performance.

MDLs are determined by the laboratory and defined as the level at which the laboratory can reliably quantify the concentration of an analyte on multiple analyses. The RLs are greater than the MDLs because MDL studies are performed using laboratory-prepared samples (spiked zero air); whereas, environmental samples are naturally more variable. United States Army Corps of Engineers (USACE) requires that RLs are 3-5 times the MDL. MDLs and RLs are provided in Tables 1.4B through 1.4D of the Sauget A2 QAPP (URS 2004). For this project, data are reported below the RLs as estimated **J**. Factors that may result in elevated RLs are discussed below.

- High concentrations of target or non-target analytes may require that the sample extract be diluted to avoid saturation of the detector, or to quantify the analyte concentration within the calibration range of the instrument. Consequently, RLs are elevated in proportion to the dilution factor.

- Matrix interference may require that the sample be diluted to reduce or eliminate the interference. Consequently, the RLs are elevated in proportion to the dilution factor.
- The physical characteristics of the matrix do not permit concentration to the required final volume during sample preparation, resulting in a larger sample extract volume and, consequently, an elevation in RLs.
- Matrix interference may require the RLs be elevated because of the inability to quantify data below the elevated RL.

In a given sample, one or more of these effects may be exhibited. When the RLs have been elevated as a result of one or more of the above causes, surrogate or target compounds present at low concentrations may not be detected. Therefore, elevated RLs may cause limitations to the application of the data for its intended use. These limitations on data for contaminants of concern are discussed on a case-by-case basis.

### 5.3.2 DATA ASSESSMENT

The assessment of data involves the consideration of data uses, the identification of data which were qualified or otherwise deviated from the Sauget A2 QAPP requirements, and the limitations associated with the evaluation of data in supporting decisions to be made.

### 5.3.3 Summary of Data Quality Requirements

Data collected in the corrective measures (CM) must be of known quality to support the uses for which it is intended. Data must meet the minimum quality standards to be useful in assessing the chemicals of concern, if any were released from the site, the acceptable level of uncertainty, and the concentrations in environmental media of concern at potential exposure points. Additionally, RLs must meet the levels necessary to determine whether analytes are present at concentrations of concern (i.e., above relative background concentrations, regulatory standards, or risk-based concentrations).

Inherent in providing defensible data is the need for a QA/QC program. The QA/QC program must have measurement tools so that data collected will be of known quality and legally defensible. QA/QC objectives for sampling and analysis were developed for this project which uses the following as indicators: precision, accuracy, completeness, comparability, representativeness, and sensitivity.



#### 5.3.4 Data Usability Assessment

A determination of data usability was made with respect to project DQOs. Sampling issues and data review/validation issues were discussed in terms of appropriateness of using the data as intended, as well as making recommendations or limitations on data usage. These discussions address items such as elevated RLs, analytes suspected as laboratory contaminants, potential bias in results, and professional judgment utilized in the data review/validation. The data assessment summary is provided in Section 8 of this QCSR.

The A2 sampling activities from September, 2007 to October, 2007 resulted in the collection of 32 soil gas samples, 3 field duplicate samples and 4 field blank samples. The sample results were submitted in multiple SDGs and are noted 709432 through 710169. The samples were identified for the following parameters VOCs by TO-15, TO-15 SIM and Oxygen. All samples were sent to Air Toxics, LTD in Folsom, CA.

Appendix C contains the data quality reviews for all samples. The data quality reviews have been organized by sample delivery group (SDG).

#### 6.1 DATA QUALITY REVIEW CHECKLISTS FOR ALL SDGS

SDGs were reviewed for each parameter separately. Appendix C contains the detailed review checklists for each parameter. In addition, a list of qualifiers for each SDG is provided at the end of the subsequent checklists for that SDG.

## 7.1 INTRODUCTION

Appendix C summarizes the full validation reports for ten percent of the chemical data for samples collected during the 2007 Sauget A2 field effort. The validation was completed in accordance with USEPA CLP National Functional Guidelines for Organic Data Review (USEPA 1999), where applicable to USEPA Methods. Additionally, QA/QC criteria established in the QAPP (URS 2004) was used.

## 7.2 LEVEL IV VALIDATION OF DATA

SDGs were validated at a rate of ten percent for each parameter. Appendix C contains the detailed validation checklists from each parameter.

## 8.1 OVERALL DATA ASSESSMENT

Quality issues for the data were assessed to evaluate their affect on the major data uses. In general, the objective of the sampling event was to gather data sufficient to evaluate data usability in support of the Supplemental Investigation.

Based on the criteria outlined, all data have met the DQOs and should be accepted for their intended use.

Overall accuracy and precision, assessed by the analysis of LCS and surrogate compounds, was approximately 99.5 percent. Representativeness, assessed by the analysis of field blank samples and field duplicate samples was also acceptable. One hundred percent of the field duplicate results were within criteria. Completeness, defined as the percentage of usable data (data not qualified as **R**), was approximately 100 percent. Comparability was acceptable as samples were analyzed using the standard operating procedures throughout the project duration. Therefore, the overall PARCC parameters were acceptable. Sensitivity, and its impact on data usability, is included in the report.

## 8.2 SAMPLING ISSUES

No sampling issues impacted data quality. Section 3 summarizes issues and documents that impact to the project DQO's.

## 8.3 DATA REVIEW/VALIDATION ISSUES

For laboratory analytical data, QA objectives were specified in the Sauget A2 QAPP (URS 2004). The QA objectives were used as indicators of the quality of data necessary to support identification and quantification of potential chemicals of concern. The data was reviewed and validated as identified in the QAPP (URS 2004). While the data review assessed the data based on the QC summary forms, the data validation was completed to determine if a more extensive review of the data indicated noncompliance with the method SOPs.

As presented in Appendix C, analytical results for some samples were qualified as **UJ** or **J** to indicate the quality control associated with that data did not meet evaluation criteria; however, they could be used for decision-making purposes. Analytical results were also qualified as **U** due to field blank contamination. Appendix C summarizes all qualifications based on Data Quality Reviews and all qualifications based on Data Quality Validations.

**8.4 APPROPRIATENESS**

Analytical methodologies identified in Section 4 were utilized to help determine the presence of any chemicals of concern. With respect to the site description, the analytical methods utilized were appropriate to assess all chemicals of concern.

**8.5 LIMITATIONS**

Limitations occur when reporting limits have been elevated above the decision point, or data were detected below reporting limits (resulting in estimated data). The summary of analytical data presented in Appendix A identifies the reporting limits for each sample analysis, and the qualifications associated with the data. No limitations were identified. Table 6-11 summarizes all qualifications to the data based on the data review and validation procedures.

- U.S. Environmental Protection Agency (USEPA). 2005. Test Methods for Evaluating Solid Waste Physical/Chemical Methods. SW846. Third Edition. Final Update IIIB.
- U.S. Environmental Protection Agency (USEPA). 1999. National Functional Guidelines for Organic Data Review. USEPA Contract Laboratory Program. EPA 540/R-9/008. October.











TABLE 6-11

## Summary of Qualifications for SDG 710169

| SDG    | Sample ID  | Analysis  | Analyte                 | URS Qual | Code | New RL |
|--------|------------|-----------|-------------------------|----------|------|--------|
| 709432 | VI-2-D     | TO-15     | 4-Ethyltoluene          | U        | X    | -      |
| 709432 | VI-2-B     | TO-15     | 2-Butanone              | U        | X    | -      |
| 709432 | VI-2-B     | TO-15     | Benzene                 | U        | X    | -      |
| 709494 | VI-4-A     | TO-15     | Freon 12                | UJ       | L    | -      |
| 709494 | VI-4-B     | TO-15     | Freon 12                | UJ       | L    | -      |
| 709494 | VI-3-A     | TO-15     | Freon 12                | J        | L    | -      |
| 709528 | VI-3-B     | TO-15     | Freon 12                | J        | L    | -      |
| 709528 | VI-3-C     | TO-15     | Freon 12                | UJ       | L    | -      |
| 709528 | VI-4-C     | TO-15     | Freon 12                | J        | L    | -      |
| 709528 | VI-4-C DUP | TO-15     | Freon 12                | J        | L    | -      |
| 709528 | VI-4-D     | TO-15     | Freon 12                | UJ       | L    | -      |
| 709528 | VI-4-E     | TO-15     | Freon 12                | UJ       | L    | -      |
| 709557 | VI-5-A     | TO-15     | <i>m,p</i> -Xylene      | U        | X    | -      |
| 709557 | VI-5-A     | TO-15     | 4-Ethyltoluene          | U        | X    | -      |
| 709557 | VI-5-B     | TO-15     | 2-Butanone              | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | 2-Butanone              | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | <i>m,p</i> -Xylene      | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | <i>o</i> -Xylene        | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | 4-Ethyltoluene          | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | 1,2,4-Trimethylbenzene  | U        | X    | -      |
| 709557 | VI-5-C     | TO-15     | Freon 114               | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Chloroethane            | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Ethanol                 | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Acetone                 | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Methyl tert-butyl ether | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Hexane                  | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | 1,1-Dichloroethane      | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | cis-1,2-Dichloroethene  | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Cyclohexane             | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Heptane                 | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Toluene                 | J        | S    | -      |
| 709557 | VI-5-C     | TO-15     | Tetrachloroethane       | J        | S    | -      |
| 709557 | VI-5-C     | TO-15 SIM | Trichloroethene         | J        | S    | -      |
| 709576 | VI-12-A    | TO-15     | 1,2-Dichlorobenzene     | J        | C    | -      |
| 709576 | VI-10-A    | TO-15     | alpha-Chlorotoluene     | UJ       | C    | -      |
| 709576 | VI-10-A    | TO-15     | Methyl tert-butyl ether | UJ       | C    | -      |
| 709576 | VI-6-A     | TO-15     | alpha-Chlorotoluene     | UJ       | C    | -      |
| 709576 | VI-6-A     | TO-15     | Methyl tert-butyl ether | UJ       | C    | -      |
| 709576 | VI-12-A    | TO-15     | Ethanol                 | UJ       | C    | -      |
| 709576 | VI-12-A    | TO-15     | Methyl tert-butyl ether | UJ       | C    | -      |
| 709576 | VI-10-A    | TO-15     | 2-Butanone              | J        | C    | -      |
| 709576 | VI-6-A     | TO-15     | 2-Butanone              | UJ       | C    | -      |
| 709647 | VI-11-A    | TO-15     | Acetone                 | U        | X    | -      |
| 709647 | VI-11-A    | TO-15     | 2-Butanone              | U        | X    | -      |
| 709647 | VI-11-A    | TO-15     | <i>m,p</i> -Xylene      | U        | X    | -      |
| 709647 | VI-13-A    | TO-15     | 2-Butanone              | U        | X    | -      |
| 709647 | VI-13-A    | TO-15     | Benzene                 | U        | X    | -      |
| 709647 | VI-13-A    | TO-15     | <i>m,p</i> -Xylene      | U        | X    | -      |

## Notes:

Dashed lines indicate a new RL was not required

C = Initial or continuing calibration %D or %RSD outside evaluation criteria

J = Estimated

L = Low LCS Recovery

S = High Surrogate Recovery

SIM = Selected Ion Monitoring

U = Non-detect

UJ = Estimated non-detect

X = Field Blank Contamination

**TABLE 6-10**

**Summary of Qualifications for SDG 710169**

| <b>SDG</b> | <b>Sample ID</b>  | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual</b> | <b>Code</b> | <b>New RL</b> |
|------------|-------------------|-----------------|----------------|-----------------|-------------|---------------|
| 710169     | No Qualifications |                 |                |                 |             |               |

**TABLE 6-9**

**Summary of Qualifications for SDG 710142**

| <b>SDG</b> | <b>Sample ID</b>  | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual</b> | <b>Code</b> | <b>New RL</b> |
|------------|-------------------|-----------------|----------------|-----------------|-------------|---------------|
| 710142     | No Qualifications |                 |                |                 |             |               |

**TABLE 6-8**

**Summary of Qualifications for SDG 710035**

| <b>SDG</b> | <b>Sample ID</b>  | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual</b> | <b>Code</b> | <b>New RL</b> |
|------------|-------------------|-----------------|----------------|-----------------|-------------|---------------|
| 710035     | No Qualifications |                 |                |                 |             |               |

**TABLE 6-7**

**Summary of Qualifications for SDG 709647**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b>     | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|--------------------|------------------|-------------|---------------|
| 709647     | VI-11-A          | TO-15           | Acetone            | U                | X           | -             |
| 709647     | VI-11-A          | TO-15           | 2-Butanone         | U                | X           | -             |
| 709647     | VI-11-A          | TO-15           | <i>m,p</i> -Xylene | U                | X           | -             |
| 709647     | VI-13-A          | TO-15           | 2-Butanone         | U                | X           | -             |
| 709647     | VI-13-A          | TO-15           | Benzene            | U                | X           | -             |
| 709647     | VI-13-A          | TO-15           | <i>m,p</i> -Xylene | U                | X           | -             |

Notes:

Dashed lines indicate a new RL was not required

U = Non-detect

X = Field Blank Contamination

**TABLE 6-6**

**Summary of Qualifications for SDG 709608**

| <b>SDG</b> | <b>Sample ID</b>  | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|-------------------|-----------------|----------------|------------------|-------------|---------------|
| 709608     | No Qualifications |                 |                |                  |             |               |



**TABLE 6-5****Summary of Qualifications for SDG 709576**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b>          | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|-------------------------|------------------|-------------|---------------|
| 709576     | VI-12-A          | TO-15           | 1,2-Dichlorobenzene     | J                | C           | -             |
| 709576     | VI-10-A          | TO-15           | alpha-Chlorotoluene     | UJ               | C           | -             |
| 709576     | VI-10-A          | TO-15           | Methyl tert-butyl ether | UJ               | C           | -             |
| 709576     | VI-6-A           | TO-15           | alpha-Chlorotoluene     | UJ               | C           | -             |
| 709576     | VI-6-A           | TO-15           | Methyl tert-butyl ether | UJ               | C           | -             |
| 709576     | VI-12-A          | TO-15           | Ethanol                 | UJ               | C           | -             |
| 709576     | VI-12-A          | TO-15           | Methyl tert-butyl ether | UJ               | C           | -             |
| 709576     | VI-10-A          | TO-15           | 2-Butanone              | J                | C           | -             |
| 709576     | VI-6-A           | TO-15           | 2-Butanone              | UJ               | C           | -             |

Notes:

Dashed lines indicate a new RL was not required

C = Initial or continuing calibration %D or %RSD outside evaluation criteria

J = Estimated

UJ = Estimated non-detect

**TABLE 6-4**

**Summary of Qualifications for SDG 709557**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b>          | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|-------------------------|------------------|-------------|---------------|
| 709557     | VI-5-A           | TO-15           | <i>m,p</i> -Xylene      | U                | X           | -             |
| 709557     | VI-5-A           | TO-15           | 4-Ethyltoluene          | U                | X           | -             |
| 709557     | VI-5-B           | TO-15           | 2-Butanone              | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | 2-Butanone              | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | <i>m,p</i> -Xylene      | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | <i>o</i> -Xylene        | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | 4-Ethyltoluene          | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | 1,2,4-Trimethylbenzene  | U                | X           | -             |
| 709557     | VI-5-C           | TO-15           | Freon 114               | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Chloroethane            | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Ethanol                 | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Acetone                 | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Methyl tert-butyl ether | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Hexane                  | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | 1,1-Dichloroethane      | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | cis-1,2-Dichloroethene  | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Cyclohexane             | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Heptane                 | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Toluene                 | J                | S           | -             |
| 709557     | VI-5-C           | TO-15           | Tetrachloroethane       | J                | S           | -             |
| 709557     | VI-5-C           | TO-15 SIM       | Trichloroethene         | J                | S           | -             |

Notes:

Dashed lines indicate a new RL was not required

J = Estimated

S = High Surrogate Recovery

U = Non-detect

X = Field Blank Contamination

**TABLE 6-3****Summary of Qualifications for SDG 709528**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|----------------|------------------|-------------|---------------|
| 709528     | VI-3-B           | TO-15           | Freon 12       | J                | L           | -             |
| 709528     | VI-3-C           | TO-15           | Freon 12       | UJ               | L           | -             |
| 709528     | VI-4-C           | TO-15           | Freon 12       | J                | L           | -             |
| 709528     | VI-4-C DUP       | TO-15           | Freon 12       | J                | L           | -             |
| 709528     | VI-4-D           | TO-15           | Freon 12       | UJ               | L           | -             |
| 709528     | VI-4-E           | TO-15           | Freon 12       | UJ               | L           | -             |

Notes:

Dashed lines indicate a new RL was not required

J = Estimated

L = Low LCS Recovery

UJ = Estimated non-detect

**TABLE 6-2**

**Summary of Qualifications for SDG 709494**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|----------------|------------------|-------------|---------------|
| 709494     | VI-4-A           | TO-15           | Freon 12       | UJ               | L           | -             |
| 709494     | VI-4-B           | TO-15           | Freon 12       | UJ               | L           | -             |
| 709494     | VI-3-A           | TO-15           | Freon 12       | J                | L           | -             |

Notes:

Dashed lines indicate a new RL was not required

J = Estimated

L = Low LCS Recovery

UJ = Estimated non-detect

**TABLE 6-1**

**Summary of Qualifications for SDG 709432**

| <b>SDG</b> | <b>Sample ID</b> | <b>Analysis</b> | <b>Analyte</b> | <b>URS Qual.</b> | <b>Code</b> | <b>New RL</b> |
|------------|------------------|-----------------|----------------|------------------|-------------|---------------|
| 709432     | VI-2-D           | TO-15           | 4-Ethyltoluene | U                | X           | -             |
| 709432     | VI-2-B           | TO-15           | 2-Butanone     | U                | X           | -             |
| 709432     | VI-2-B           | TO-15           | Benzene        | U                | X           | -             |

Notes:

Dashed lines indicate a new RL was not required

U = Non-detect

X = Field Blank Contamination

**TABLE 4-1**

**Data Review/Validation Qualifier Codes**

| GC/MS Organics |   | GC and HPLC Organics |   | Inorganics and Conventionals |   |
|----------------|---|----------------------|---|------------------------------|---|
| Code           | Interpretation  | Code                 | Interpretation  | Code                         | Interpretation                                    |
| a              | Incorrect or incomplete analytical sequence               | a                    | Incorrect or incomplete analytical sequence           | a                            | Incorrect or incomplete analytical sequence       |
| c              | Calibration failure; poor (RRF) or unstable (%D) response | b                    | Instrument performance failure or poor chromatography | c                            | Calibration failure                               |
| d              | MS/MSD or LCS/LCSD RPD imprecision                        | c                    | Calibration failure; poor or unstable (%D) response   | d                            | MSIMSD or LCSILCSD RPD imprecision                |
| e              | Sample preservation or cooler temperature failure         | d                    | MS/MSD or LCS/LCSD RPD imprecision                    | e                            | Sample preservatmon or cooler temperature failure |
| f              | Field duplicate imprecision                               | e                    | Sample preservation or cooler temperature failure     | f                            | Field duplicate imprecision                       |
| h              | Holding time violation                                    | f                    | Field duplicate imprecision                           | h                            | Holding time violation                            |
| j              | Tuning Failure or poor mass spectrometer performance      | g                    | Dual column confirmation imprecision                  | k                            | Laboratory duplicate imprecision                  |
| l              | LCS recovery failure                                      | h                    | Holding time violation                                | l                            | LCS recovery failure                              |
| m              | MS/MSD recovery failure                                   | l                    | LCS recovery failure                                  | m                            | MS/MSD recovery failure                           |
| n              | Internal standard failure                                 | m                    | MS/MSD recovery failure                               | n                            | ICP interference check sample failure             |
| p              | Air bubble (> 6 mm or ¼ inch) in VOC vials                | p                    | Air bubble (>6 mm or 1/4 inch) in VOC vials           | o                            | Calibration blank contamination                   |
| q              | Concentration exceeded the linear range                   | q                    | Concentration exceeded the linear range               | p                            | Preparation blank contamination                   |
| r              | linearity (%RSD or r) failure in initial calibration      | r                    | Linearity (%RSD or r) failure in initial calibration  | q                            | Concentration exceeded the linear range           |
| s              | Surrogate failure   | s                    | Surrogate failure                                     | r                            | Linearity failure in calibration or MSA           |
| t              | Tentatively identified Compound                           | u                    | No confirmation column                                | s                            | Serial dilution failure                           |
| w              | Identification criteria failure                           | w                    | Identification criteria failure                       | v                            | Post-digestion spike failure                      |
| x              | Field and/or equipment blank contamination                | x                    | Field and/or equipment blank contamination            | w                            | CRDL standard recovery failure                    |
| y              | Trip blank contamination                                  | y                    | Trip blank contamination                              | x                            | Field and/or equipment blank contamination        |
| z              | Method blank and/or storage blank contamination           | z                    | Method blank and/or storage blank contamination       | z                            | Laboratory storage blank contamination            |
| Q              | Other — see bottom of data report for explanation         | Q                    | Other — see bottom of data report for explanation     | Q                            | Other - see bottom of data report for explanation |

The reason code indicates the type of quality control failure that lead to the application of the data validation flag.

**TABLE 2-1****Summary of Field Duplicate Samples Sauget Area 2**

| <b>SDG</b> | <b>Sample ID</b> | <b>Sample Date</b> | <b>Sample Time</b> | <b>Matrix</b> | <b>VOCs (TO-15)</b> | <b>VOC (TO-15 SIM)</b> | <b>Oxygen (Modified ASTM D-1946)</b> |
|------------|------------------|--------------------|--------------------|---------------|---------------------|------------------------|--------------------------------------|
| 709528     | VI-4-C           | 9/24/07            | 1210               | Soil gas      | x                   | x                      |                                      |
| 709528     | VI-4-C DUP       | 9/24/07            | 1210               | Soil gas      | x                   | x                      |                                      |
| 709647     | VI-11-A          | 9/28/07            | 939                | Soil gas      | x                   | x                      | x                                    |
| 709647     | VI-11-A DUP      | 9/28/07            | 939                | Soil gas      | x                   | x                      | x                                    |
| 710169     | VI-7-C           | 10/2/07            | 1144               | Soil gas      | x                   | x                      | x                                    |
| 710169     | VI-7-C DUP       | 10/2/07            | 1144               | Soil gas      | x                   | x                      | x                                    |

**TABLE 1-1**

**Summary of Collected Samples Sauget Area 2**

| SDG    | Sample ID    | Sample Date | Sample Time | Matrix   | VOCs (TO-15) | VOC (TO-15 SIM) | Oxygen (Modified ASTM D-1946) |
|--------|--------------|-------------|-------------|----------|--------------|-----------------|-------------------------------|
| 709432 | VI-2-B       | 9/19/07     | 929         | Soil gas | x            | x               | x                             |
| 709432 | VI-091907-FB | 9/19/07     | 1042        | Soil gas | x            | x               | x                             |
| 709432 | VI-2-D       | 9/19/07     | 1505        | Soil gas | x            | x               | x                             |
| 709494 | VI-4-A       | 9/21/07     | 838         | Soil gas | x            | x               | x                             |
| 709494 | VI-4-B       | 9/21/07     | 1007        | Soil gas | x            | x               | x                             |
| 709494 | VI-092107-FB | 9/21/07     | 1022        | Soil gas | x            | x               | x                             |
| 709494 | VI-3-A       | 9/21/07     | 1412        | Soil gas | x            | x               | x                             |
| 709528 | VI-3-B       | 9/24/07     | 846         | Soil gas | x            | x               |                               |
| 709528 | VI-3-C       | 9/24/07     | 938         | Soil gas | x            | x               |                               |
| 709528 | VI-4-C       | 9/24/07     | 1210        | Soil gas | x            | x               |                               |
| 709528 | VI-4-C DUP   | 9/24/07     | 1210        | Soil gas | x            | x               |                               |
| 709528 | VI-4-D       | 9/24/07     | 1309        | Soil gas | x            | x               |                               |
| 709528 | VI-4-E       | 9/24/07     | 1524        | Soil gas | x            | x               |                               |
| 709557 | VI-5-A       | 9/25/07     | 831         | Soil gas | x            | x               |                               |
| 709557 | VI-5-B       | 9/25/07     | 924         | Soil gas | x            | x               |                               |
| 709557 | VI-5-C       | 9/25/07     | 1204        | Soil gas | x            | x               |                               |
| 709557 | VI-092507-FB | 9/25/07     | 1344        | Soil gas | x            | x               |                               |
| 709576 | VI-10-A      | 9/2/07      | 823         | Soil gas | x            | x               | x                             |
| 709576 | VI-6-A       | 9/26/07     | 1147        | Soil gas | x            | x               | x                             |
| 709576 | VI-12-4      | 9/26/07     | 1514        | Soil gas | x            | x               | x                             |
| 709608 | VI-10-D      | 9/27/07     | 1026        | Soil gas | x            | x               | x                             |
| 709647 | VI-11-A      | 9/28/07     | 939         | Soil gas | x            | x               | x                             |
| 709647 | VI-11-A DUP  | 9/28/07     | 939         | Soil gas | x            | x               | x                             |
| 709647 | VI-13-A      | 9/28/07     | 1241        | Soil gas | x            | x               | x                             |
| 709647 | VI-092807-FB | 9/28/07     | 1312        | Soil gas | x            | x               | x                             |
| 710035 | VI-10-B1     | 10/1/07     | 1027        | Soil gas | x            |                 |                               |
| 710035 | VI-10-C1     | 10/1/07     | 1002        | Soil gas | x            |                 |                               |
| 710035 | VI-6-B1      | 10/1/07     | 1320        | Soil gas | x            |                 |                               |
| 710035 | VI-6-C1      | 10/1/07     | 1401        | Soil gas | x            |                 |                               |
| 710142 | VI-9-A       | 10/3/07     | 824         | Soil gas | x            | x               | x                             |
| 710142 | VI-9-B       | 10/3/07     | 856         | Soil gas | x            | x               | x                             |
| 710142 | VI-9-C       | 10/3/07     | 1058        | Soil gas | x            | x               | x                             |
| 710142 | VI-8-C       | 10/3/07     | 1601        | Soil gas | x            | x               | x                             |
| 710169 | VI-7-A       | 10/2/07     | 908         | Soil gas | x            | x               | x                             |
| 710169 | VI-7-B       | 10/2/07     | 932         | Soil gas | x            | x               | x                             |
| 710169 | VI-7-C       | 10/2/07     | 1144        | Soil gas | x            | x               | x                             |
| 710169 | VI-7-C DUP   | 10/2/07     | 1144        | Soil gas | x            | x               | x                             |
| 710169 | VI-7-D       | 10/2/07     | 1214        | Soil gas | x            | x               | x                             |
| 710169 | VI-8-A       | 10/2/07     | 1435        | Soil gas | x            | x               | x                             |



TABLE A-1

## Analytical Results SDGs 709432 - 710169

| SDG    | Sample ID  | Matrix   | Parameter | Chemical                | Result (µg/m <sup>3</sup> ) | URS Qual, Code | RL (µg/m <sup>3</sup> ) |
|--------|------------|----------|-----------|-------------------------|-----------------------------|----------------|-------------------------|
| 709432 | VI-2-D     | Soil Gas | TO-15     | 4-Ethyltoluene          | 3.7                         | U,X            | 3.7                     |
| 709432 | VI-2-B     | Soil Gas | TO-15     | 2-Butanone              | 1.2                         | U,X            | 1.2                     |
| 709432 | VI-2-B     | Soil Gas | TO-15     | Benzene                 | 1.3                         | U,X            | 1.3                     |
| 709494 | VI-4-A     | Soil Gas | TO-15     | Freon 12                | 7.8                         | UJ,L           | 7.8                     |
| 709494 | VI-4-B     | Soil Gas | TO-15     | Freon 12                | 5.5                         | UJ,L           | 5.5                     |
| 709494 | VI-3-A     | Soil Gas | TO-15     | Freon 12                | 1.5                         | J,L            | 0.84                    |
| 709528 | VI-3-B     | Soil Gas | TO-15     | Freon 12                | 5.9                         | J,L            | 2.0                     |
| 709528 | VI-3-C     | Soil Gas | TO-15     | Freon 12                | 2.0                         | UJ,L           | 2.0                     |
| 709528 | VI-4-C     | Soil Gas | TO-15     | Freon 12                | 7.5                         | J,L            | 3.8                     |
| 709528 | VI-4-C DUP | Soil Gas | TO-15     | Freon 12                | 8.6                         | J,L            | 8                       |
| 709528 | VI-4-D     | Soil Gas | TO-15     | Freon 12                | 5.3                         | UJ,L           | 5.3                     |
| 709528 | VI-4-E     | Soil Gas | TO-15     | Freon 12                | 0.81                        | UJ,L           | 0.81                    |
| 709557 | VI-5-A     | Soil Gas | TO-15     | <i>m,p</i> -Xylene      | 1.8                         | U,X            | 1.8                     |
| 709557 | VI-5-A     | Soil Gas | TO-15     | 4-Ethyltoluene          | 2.1                         | U,X            | 2.1                     |
| 709557 | VI-5-B     | Soil Gas | TO-15     | 2-Butanone              | 4.6                         | U,X            | 4.6                     |
| 709557 | VI-5-C     | Soil Gas | TO-15     | 2-Butanone              | 0.55                        | U,X            | 0.55                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | <i>m,p</i> -Xylene      | 0.81                        | U,X            | 0.81                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | <i>o</i> -Xylene        | 0.81                        | U,X            | 0.81                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | 4-Ethyltoluene          | 0.92                        | U,X            | 0.92                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | 1,2,4-Trimethylbenzene  | 0.92                        | U,X            | 0.92                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Freon 114               | 3.2                         | J,S            | 1.3                     |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Chloroethane            | 0.64                        | J,S            | 0.49                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Ethanol                 | 23 J                        | J,S            | 1.8                     |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Acetone                 | 85                          | J,S            | 2.2                     |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Methyl tert-butyl ether | 38 J                        | J,S            | 0.67                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Hexane                  | 82                          | J,S            | 0.66                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | 1,1-Dichloroethane      | 18                          | J,S            | 0.76                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | cis-1,2-Dichloroethene  | 3.1                         | J,S            | 0.74                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Cyclohexane             | 20                          | J,S            | 0.64                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Heptane                 | 14                          | J,S            | 0.77                    |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Toluene                 | 100                         | J,S            | 0.7                     |
| 709557 | VI-5-C     | Soil Gas | TO-15     | Tetrachloroethane       | 1.5                         | J,S            | 1.3                     |
| 709557 | VI-5-C     | Soil Gas | TO-15 SIM | Trichloroethene         | 0.48                        | J,S            | 0.2                     |
| 709576 | VI-12-A    | Soil Gas | TO-15     | 1,2-Dichlorobenzene     | 5.7                         | J,C            | 0.97                    |
| 709576 | VI-10-A    | Soil Gas | TO-15     | alpha-Chlorotoluene     | 1500                        | UJ,C           | 1500                    |
| 709576 | VI-10-A    | Soil Gas | TO-15     | Methyl tert-butyl ether | 1100                        | UJ,C           | 1100                    |
| 709576 | VI-6-A     | Soil Gas | TO-15     | alpha-Chlorotoluene     | 8.8                         | UJ,C           | 8.8                     |
| 709576 | VI-6-A     | Soil Gas | TO-15     | Methyl tert-butyl ether | 6.2                         | UJ,C           | 6.2                     |
| 709576 | VI-12-A    | Soil Gas | TO-15     | Ethanol                 | 1.5                         | UJ,C           | 1.5                     |
| 709576 | VI-12-A    | Soil Gas | TO-15     | Methyl tert-butyl ether | 0.58                        | UJ,C           | 0.58                    |
| 709576 | VI-10-A    | Soil Gas | TO-15     | 2-Butanone              | 7000                        | J,C            | 880                     |
| 709576 | VI-6-A     | Soil Gas | TO-15     | 2-Butanone              | 5                           | UJ,C           | 5                       |
| 709647 | VI-11-A    | Soil Gas | TO-15     | Acetone                 | 3.8                         | U,X            | 3.8                     |
| 709647 | VI-11-A    | Soil Gas | TO-15     | 2-Butanone              | 0.95                        | U,X            | 0.95                    |
| 709647 | VI-11-A    | Soil Gas | TO-15     | <i>m,p</i> -Xylene      | 1.4                         | U,X            | 1.4                     |
| 709647 | VI-13-A    | Soil Gas | TO-15     | 2-Butanone              | 0.46                        | U,X            | 0.46                    |
| 709647 | VI-13-A    | Soil Gas | TO-15     | Benzene                 | 0.5                         | U,X            | 0.5                     |
| 709647 | VI-13-A    | Soil Gas | TO-15     | <i>m,p</i> -Xylene      | 0.69                        | U,X            | 0.69                    |

## Notes:

Dashed lines indicate a new RL was not required

µg/m<sup>3</sup> = micrograms per cubic meters

C = Initial or continuing calibration %D or %RSD outside evaluation criteria

J = Estimated

L = Low LCS Recovery

S = High Surrogate Recovery

SIM = Selected Ion Monitoring

U = Non-detect

UJ = Estimated non-detect

X = Field Blank Contamination



# CHAIN-OF-CUSTODY RECORD

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180 BLUE RAVINE ROAD, SUITE B  
FOLSOM, CA 95630-4719  
(916) 985-1000 FAX (916) 985-1020

Page \_\_\_\_ of \_\_\_\_

Project Manager Bob Veenstra  
Collected by: (Print and Sign) Sherry Moore Sherry Moore  
Company URS Email \_\_\_\_\_  
Address 1001 Highlands Plaza Dr. City St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

## Project Info:

P.O. # \_\_\_\_\_

Project # 21561683

Project Name SA2

## Turn Around Time:

☒ Normal

☐ Rush

specify \_\_\_\_\_

Lab Use Only.

Pressurized by: B

Date: 9/2/07

Pressurization Gas:

N<sub>2</sub> He

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|--------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                    | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-2-B                       | 000002511 | 9-19-07            | 0929               | TO-15              | 30                       | 5     | 4.5     | 5.0         |
| 02A      | VI-0A1907-FB                 | 000201098 | 9-19-07            | 1042               | TO-15              | 30                       | 5     | 2.5     | 2.5         |
| 03A      | VI-2-D                       | 000003385 | 9-19-07            | 1505               | TO-15              | 30                       | 5     | 3.5     | 3.5         |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |

|  |   |                      |
|--|---|----------------------|
| Relinquished by: (signature) <u>Sherry Moore</u> Date/Time <u>9-19-07/1705</u> | Received by: (signature) <u>Margie Brown</u> Date/Time <u>9/20/07</u> | Notes:<br><u>SA2</u> |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                        |                      |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                        |                      |

| Lab Use Only | Shipper Name | Air Bill #      | Temp (°C)   | Condition  | Custody Seals Intact? | Work Order #                     |
|--------------|--------------|-----------------|-------------|------------|-----------------------|----------------------------------|
|              | <u>FedEx</u> | <u>86063891</u> | <u>9439</u> | <u>N/A</u> | <u>Good</u>           | <u>Yes</u> <u>No</u> <u>None</u> |
|              |              |                 |             |            |                       | <u>0709438</u>                   |



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(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Velutro  
Collected by: (Print and Sign) Sherry Hase  
Company URS Corp Email \_\_\_\_\_  
Address 1001 Highland Plaza City St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

### Project Info:

P.O. # \_\_\_\_\_  
Project # 21561683  
Project Name SAZ

### Turn Around Time:

☐ Normal  
☐ Rush  
specify \_\_\_\_\_

### Lab Use Only

Pressurized by: BS  
Date: 9/24/07  
Pressurization Gas: N<sub>2</sub> He \_\_\_\_\_

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|--------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                    | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-4-A                       | 000002025 | 9-21-07            | 0838               | TD-15              | 30                       | 5     | 4.5     | 5.0         |
| 02A      | VI-4-B                       | 013656    |                    | 1007               | TD-15              | 30                       | 5     | 4.0     | 5.0         |
| 03A      | VI-092107-FB                 | 000001101 |                    | 1022               | TD-15              | 30                       | 5     | 4.5     | 5.0         |
| 04A      | VI-3-A                       | 020003510 |                    | 1412               | TD-15              | 30                       | 5     | 4.0     | 5.0         |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |

|  |   |        |
|--|---|--------|
| Relinquished by: (signature) _____ Date/Time _____ | Received by: (signature) <u>ATL</u> Date/Time <u>9/24/07 0830</u> | Notes: |
| Relinquished by: (signature) _____ Date/Time _____ | Received by: (signature) _____ Date/Time _____                    |        |
| Relinquished by: (signature) _____ Date/Time _____ | Received by: (signature) _____ Date/Time _____                    |        |

| Lab Use Only | Shipper Name | Air Bill #           | Temp. (°C) | Condition   | Custody Seals Intact? | Work Order #   |
|--------------|--------------|----------------------|------------|-------------|-----------------------|----------------|
|              | <u>FedEx</u> | <u>86063891 9504</u> | <u>NA</u>  | <u>good</u> | Yes No <u>None</u>    | <u>0709494</u> |



# CHAIN-OF-CUSTODY RECORD

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FOLSOM, CA 95630-4719  
(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Verstra

Collected by: (Print and Sign) Sherry Moore / Sherry Moore

Company URS Corp Email \_\_\_\_\_

Address 1001 Highland Park Dr. City St. Louis State MO Zip 63110

Phone 314-429-0100 Fax 314-429-0412

### Project Info:

P.O. # \_\_\_\_\_

Project # 21521683

Project Name SAZ

### Turn Around Time:

☒ Normal

☐ Rush

specify \_\_\_\_\_

Lab Use Only

Pressurized by: VLR

Date: 9/26/01

Pressurization Gas:

(N) He

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|--------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                    | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-3-B                       | 000002476 | 9-24-01            | 0846               | TD-15              | 30                       | 5     | 5.0%    | 5.00psi     |
| 02A      | VI-3-C                       | 000002591 |                    | 0935               |                    | 27                       | 5     | 5.0%    |             |
| 03A      | VI-4-C                       | 000002965 |                    | 1210               |                    | 30                       | 5     | 3.5%    |             |
| 04A      | VI-4-C DUP                   | 436       |                    | 1210               |                    | 30                       | 5     | 5.0%    |             |
| 05A      | VI-4-D                       | 000000963 |                    | 1309               |                    | 30                       | 5     | 5.0%    |             |
| 06A      | VI-4-E                       | 000002258 |                    | 1524               |                    | 30                       | 5     | 5.5%    |             |

Relinquished by: (signature) Date/Time

Sherry Moore 9-24-01 1700

Received by: (signature) Date/Time

Monica Green 9/25/01 845

Notes:

Relinquished by: (signature) Date/Time

Received by: (signature) Date/Time

Relinquished by: (signature) Date/Time

Received by: (signature) Date/Time

Lab Shipper Name

Air Bill #

Temp (°C)

Condition

Custody Seals Intact?

Work Order #

Lab Use Only

Fed. Ex

860638919467

N/A

Good

Yes No (None)

0709528



# CHAIN-OF-CUSTODY RECORD

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Project Manager Bob Veunstra  
Collected by: (Print and Sign) Sherry Moore / Sherry La  
Company UPS Corp. Email \_\_\_\_\_  
Address 1001 Highland Park Dr. St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

|                         |                           |  |                               |
|-------------------------|---------------------------|--|-------------------------------|
| Project Info:           |                           | Turn Around Time:                          | Lab Use Only                  |
| P.O. # _____            | Project # <u>21561683</u> | <input checked="" type="checkbox"/> Normal | Pressurized by: <u>DP</u>     |
| Project Name <u>SA2</u> |                           | <input type="checkbox"/> Rush              | Date: <u>9/25/07</u>          |
|                         |                           | specify _____                              | Pressurization Gas: <u>He</u> |

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|--------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                    | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-5-A                       | 000003020 | 9-25-07            | 0831               | TD-15              | 24.5                     | 5     | 1609    | 510         |
| 02A      | VI-5-B                       | 000001893 | ↓                  | 0924               | ↓                  | 30                       | 5     | 4.0     | ↓           |
| 03A      | VI-5-C                       | 000001544 | ↓                  | 1204               | ↓                  | 30                       | 8     | 9.5     | ↓           |
| 04A      | VI-092507-FB                 | 000003042 | ↓                  | 1344               | ↓                  | 28.5                     | 5     | 5.0     | ↓           |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |
|          |                              |           |                    |                    |                    |                          |       |         |             |

|   |   |        |
|---|---|--------|
| Relinquished by: (signature) <u>Sherry La</u> Date/Time <u>9-25-07/1430</u> | Received by: (signature) <u>Marcia Grogan</u> Date/Time <u>9/25/07 8:00</u> | Notes: |
| Relinquished by: (signature) _____ Date/Time _____                          | Received by: (signature) _____ Date/Time _____                              |        |
| Relinquished by: (signature) _____ Date/Time _____                          | Received by: (signature) _____ Date/Time _____                              |        |

|              |                            |                                 |                     |                       |  |                             |
|--------------|----------------------------|---------------------------------|---------------------|-----------------------|--|-----------------------------|
| Lab Use Only | Shipper Name <u>Fed Ex</u> | Air Bill # <u>86063891 9278</u> | Temp (°C) <u>NA</u> | Condition <u>Good</u> | Custody Seals Intact? <u>Yes</u> <u>No</u> <u>None</u> | Work Order # <u>0709557</u> |
|--------------|----------------------------|---------------------------------|---------------------|-----------------------|--|-----------------------------|

0356



# CHAIN-OF-CUSTODY RECORD

## Sample Transportation Notice

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180 BLUE RAVINE ROAD, SUITE B  
FOLSOM, CA 95630-4719  
(916) 985-1000 FAX (916) 985-1020

Page \_\_\_\_ of \_\_\_\_

Project Manager Bob Verstra  
Collected by: (Print and Sign) Sherry Moore  
Company URS Corp Email \_\_\_\_\_  
Address 100 Highlands Plaza City St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

|                           |  |  |                                   |
|---------------------------|--|--|-----------------------------------|
| Project Info:             |  | Turn Around Time:                          | Lab Use Only                      |
| P.O. # _____              |  | <input checked="" type="checkbox"/> Normal | Pressurized by: <u>VR</u>         |
| Project # <u>21561683</u> |  | <input type="checkbox"/> Rush              | Date: <u>9/28/07</u>              |
| Project Name <u>SAZ</u>   |  | specify _____                              | Pressurization Gas: <u>(N)</u> He |

| Lab I.D. | Field Sample I.D. (Location) | Can #                | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |       |         |            |
|----------|------------------------------|----------------------|--------------------|--------------------|--------------------|--------------------------|-------|---------|------------|
|          |                              |                      |                    |                    |                    | Initial                  | Final | Receipt | Final test |
| D1A      | VI-10-A                      | 00000247             | 9/26/07            | 0823               | TO-15 (Oxygen)     | 30                       | 4     | 3.07kg  | 5.0psi     |
|          | <del>VI-10-B</del>           | <del>000001651</del> |                    |                    |                    |                          |       |         |            |
| O2A      | VI-6-A                       | 00000308             | 9/26/07            | 1147               | TO-15 (Oxygen)     | 30                       | 8     | 16.5kg  | 5.0psi     |
| O3A      | VI-12-A                      | 94300                | ↓                  | 1514               | TO-15 (Oxygen)     | 30                       | 6     | 5.07kg  | ✓          |
|          |                              |                      |                    |                    |                    |                          |       |         |            |
|          |                              |                      |                    |                    |                    |                          |       |         |            |
|          |                              |                      |                    |                    |                    |                          |       |         |            |
|          |                              |                      |                    |                    |                    |                          |       |         |            |
|          |                              |                      |                    |                    |                    |                          |       |         |            |
|          |                              |                      |                    |                    |                    |                          |       |         |            |

|   |  |        |
|---|--|--------|
| Relinquished by: (signature) <u>[Signature]</u> Date/Time <u>9/26/07 1700</u> | Received by: (signature) <u>Monica Grogan</u> Date/Time <u>830 9/27/07</u> | Notes: |
| Relinquished by: (signature) _____ Date/Time _____                            | Received by: (signature) _____ Date/Time _____                             |        |
| Relinquished by: (signature) _____ Date/Time _____                            | Received by: (signature) _____ Date/Time _____                             |        |

|              |                             |                                |                     |                       |                                   |                             |
|--------------|-----------------------------|--------------------------------|---------------------|-----------------------|-----------------------------------|-----------------------------|
| Lab Use Only | Shipper Name: <u>Fed Ex</u> | Air Bill # <u>860638919489</u> | Temp (°C) <u>MA</u> | Condition <u>Good</u> | Custody Seals Intact? <u>None</u> | Work Order # <u>0709578</u> |
|--------------|-----------------------------|--------------------------------|---------------------|-----------------------|-----------------------------------|-----------------------------|



# CHAIN-OF-CUSTODY RECORD

## Sample Transportation Notice

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(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Vanstra  
Collected by: (Print and Sign) Sherry Moore  
Company URS Email \_\_\_\_\_  
Address 1001 N. 1st St. City St. Louis State MO Zip 63101  
Phone 314-429-0100 Fax \_\_\_\_\_

|                    |                           |  |   |
|--------------------|---------------------------|--|---|
| Project Info:      |                           | Turn Around Time:                          | Lab Use Only  |
| P.O. # _____       | Project # <u>21561683</u> | <input checked="" type="checkbox"/> Normal | Pressurized by: <u>VLR</u>                          |
| Project Name _____ |                           | <input type="checkbox"/> Rush              | Date: <u>9/29/07</u>                                |
|                    |                           | _____ capacity                             | Pressurization Gas: <u>(N<sub>2</sub>)</u> He _____ |

| Lab I.D.   | Field Sample I.D. (Location) | Can #            | Date of Collection | Time of Collection | Analyses Requested            | Canister Pressure/Vacuum |          |              |               |
|------------|------------------------------|------------------|--------------------|--------------------|-------------------------------|--------------------------|----------|--------------|---------------|
|            |                              |                  |                    |                    |                               | Initial                  | Final    | Receipt      | Final         |
| <u>01A</u> | <u>VI-10-D</u>               | <u>000002818</u> | <u>9-27-07</u>     | <u>1026</u>        | <u>TO-15 (+O<sub>2</sub>)</u> | <u>30</u>                | <u>8</u> | <u>7.0%g</u> | <u>5.0psi</u> |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |
|            |                              |                  |                    |                    |                               |                          |          |              |               |

|  |  |              |
|--|--|--------------|
| Relinquished by: (signature) <u>Sherry Moore</u> Date/Time <u>9-27-07 1600</u> | Received by: (signature) <u>Monica Green</u> Date/Time <u>9/28/07 1845</u> | Notes: _____ |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                             |              |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                             |              |

|              |                            |                                |                     |                       |  |                             |
|--------------|----------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|
| Lab Use Only | Shipper Name <u>Fed Ex</u> | Air Bill # <u>860638919290</u> | Temp (°C) <u>MA</u> | Condition <u>Good</u> | Custody Seals Intact? <u>Yes</u> <u>No</u> <u>None</u> | Work Order # <u>0709608</u> |
|--------------|----------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|



# CHAIN-OF-CUSTODY RECORD

## Sample Transportation Notice

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(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Veenstra  
Collected by: (Print and Sign) Sherry Moore / Sherry Moore  
Company URS Corp. Email \_\_\_\_\_  
Address 1001 Highlands Plaza City St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

|                          |                           |  |   |
|--------------------------|---------------------------|--|---|
| <b>Project Info:</b>     |                           | <b>Turn Around Time:</b>   | <b>Lab Use Only</b>                         |
| P.O. # _____             | Project # <u>21561683</u> | <input checked="" type="checkbox"/> Normal<br><input type="checkbox"/> Rush<br>specify _____ | Pressurized by: <u>JS</u>                   |
| Project Name <u>SA-2</u> |                           |  | Date: <u>10/2/07</u>                        |
|                          |                           |  | Pressurization Gas: <u>N<sub>2</sub></u> He |

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested     | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|------------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                        | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-11-A                      | 000003147 | 9-28-07            | 0939               | TO-15 <u>LLSM/ASTM</u> | 30                       | 5     | 5.0" Hg | 5.0" Hg     |
| 02A      | VI-11-A DUP                  | 4588      | ↓                  | 0939               | TO-15 <u>LLSM/ASTM</u> | 30                       | 5     | 5.0" Hg | 5.0" Hg     |
| 03A      | VI-13-A                      | 12671     | ↓                  | 1241               | ↓                      | 30                       | 5     | 4.5" Hg | ↓           |
| 04A      | VI-092807-FB                 | 000003172 | ↓                  | 1312               | ↓                      | 30                       | 5     | 5.5" Hg | ↓           |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |
|          |                              |           |                    |                    |                        |                          |       |         |             |

|  |  |               |
|--|--|---------------|
| Relinquished by: (signature) <u>Sherry Moore</u> Date/Time <u>9-28-07 1700</u> | Received by: (signature) <u>cm-winter</u> Date/Time <u>9/29/07 900</u> | <b>Notes:</b> |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                         |               |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                         |               |

|                     |                           |                                |                     |                       |  |                             |
|---------------------|---------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|
| <b>Lab Use Only</b> | Shipper Name <u>Fedex</u> | Air Bill # <u>860638919456</u> | Temp (°C) <u>NA</u> | Condition <u>good</u> | Custody Seals Intact? <u>Yes</u> <u>No</u> <u>None</u> | Work Order # <u>0709647</u> |
|---------------------|---------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|





# CHAIN-OF-CUSTODY RECORD

## Sample Transportation Notice

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(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Veenstra  
Collected by: (Print and Sign) Sherry Moore  
Company URS Email Sherry.Moore@URS.com  
Address 1001 Highland Plaza Dr City St Louis State MO Zip 63110  
Phone \_\_\_\_\_ Fax \_\_\_\_\_

|                            |  |   |
|----------------------------|--|---|
| Project Info:              | Turn Around Time:                        | Lab Use Only                                  |
| P.O. # _____               | <input type="checkbox"/> Normal          | Pressurized by: <u>VFR</u>                    |
| Project # <u>245611083</u> | <input checked="" type="checkbox"/> Rush | Date: <u>10/2/07</u>                          |
| Project Name <u>SA2</u>    | <u>5-DAY</u><br><small>specify</small>   | Pressurization Gas: <u>(N<sub>2</sub>)</u> He |

| Lab I.D.   | Field Sample I.D. (Location) | Can #            | Date of Collection | Time of Collection | Analyses Requested | Canister Pressure/Vacuum |          |                |                |
|------------|------------------------------|------------------|--------------------|--------------------|--------------------|--------------------------|----------|----------------|----------------|
|            |                              |                  |                    |                    |                    | Initial                  | Final    | Receipt        | Final (psi)    |
| <u>01A</u> | <u>VI-10-B1</u>              | <u>35636</u>     | <u>10-1-07</u>     | <u>1027</u>        | <u>TO-15 Quad</u>  | <u>30</u>                | <u>5</u> | <u>4.04 Hg</u> | <u>5.0 psi</u> |
| <u>02A</u> | <u>VI-10-C1</u>              | <u>000002167</u> | <u>↓</u>           | <u>1002</u>        | <u>↓</u>           | <u>30</u>                | <u>5</u> | <u>4.54 Hg</u> | <u>↓</u>       |
| <u>03A</u> | <u>VI-6-B1</u>               | <u>000002176</u> | <u>↓</u>           | <u>1320</u>        | <u>↓</u>           | <u>29</u>                | <u>5</u> | <u>6.04 Hg</u> | <u>↓</u>       |
| <u>04A</u> | <u>VI-6-C1</u>               | <u>000000054</u> | <u>↓</u>           | <u>1401</u>        | <u>↓</u>           | <u>28</u>                | <u>5</u> | <u>6.04 Hg</u> | <u>↓</u>       |
|            |                              |                  |                    |                    |                    |                          |          |                |                |
|            |                              |                  |                    |                    |                    |                          |          |                |                |
|            |                              |                  |                    |                    |                    |                          |          |                |                |
|            |                              |                  |                    |                    |                    |                          |          |                |                |
|            |                              |                  |                    |                    |                    |                          |          |                |                |
|            |                              |                  |                    |                    |                    |                          |          |                |                |

|  |   |        |
|--|---|--------|
| Relinquished by: (signature) <u>Sherry Moore</u> Date/Time <u>10-1-07 1430</u> | Received by: (signature) <u>Monica Green</u> Date/Time <u>ATL 10/2/07 845</u> | Notes: |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                                |        |
| Relinquished by: (signature) _____ Date/Time _____                             | Received by: (signature) _____ Date/Time _____                                |        |

|              |                            |                                |                     |                       |  |                             |
|--------------|----------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|
| Lab Use Only | Shipper Name <u>Fed Ex</u> | Air Bill # <u>862325400481</u> | Temp (°C) <u>NA</u> | Condition <u>Good</u> | Custody Seals Intact? <u>Yes</u> <u>No</u> <u>None</u> | Work Order # <u>0710035</u> |
|--------------|----------------------------|--------------------------------|---------------------|-----------------------|--|-----------------------------|



# CHAIN-OF-CUSTODY RECORD

## Sample Transportation Notice

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(916) 985-1000 FAX (916) 985-1020

Page 1 of 1

Project Manager Bob Veenstra  
Collected by: (Print and Sign) Sherry Moore / Sherry Moore  
Company URS Corp Email \_\_\_\_\_  
Address 1001 Highlands Plaza City St. Louis State MO Zip 63110  
Phone 314-429-0100 Fax 314-429-0462

|                           |  |  |   |
|---------------------------|--|--|---|
| Project Info:             |  | Turn Around Time:                          | Lab Use Only:                                 |
| P.O. #                    |  | <input checked="" type="checkbox"/> Normal | Pressurized by: <u>VFR</u>                    |
| Project # <u>21561683</u> |  | <input type="checkbox"/> Rush              | Date: <u>10/5/07</u>                          |
| Project Name              |  | specify                                    | Pressurization Gas: <u>(N<sub>2</sub>) He</u> |

| Lab I.D. | Field Sample I.D. (Location) | Can #     | Date of Collection | Time of Collection | Analyses Requested       | Canister Pressure/Vacuum |       |         |             |
|----------|------------------------------|-----------|--------------------|--------------------|--------------------------|--------------------------|-------|---------|-------------|
|          |                              |           |                    |                    |                          | Initial                  | Final | Receipt | Final (psi) |
| 01A      | VI-9-A                       | 00000334  | 10-3-07            | 0824               | TO-15 LISM / ASTM D-1942 | 30                       | 5     | 4.5" Hg | 5.0 psi     |
| 02A      | VI-9-B                       | 000002638 |                    | 0856               |                          | 26.5                     | 5     | 7.5" Hg |             |
| 03A      | VI-9-C                       | 000003464 |                    | 1058               |                          | 30                       | 8     | 8.0" Hg |             |
| 04A      | VI-8-C                       | 000002592 |                    | 1601               |                          | 30                       | 8     | 7.5" Hg |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |
|          |                              |           |                    |                    |                          |                          |       |         |             |

|  |  |        |
|--|--|--------|
| Relinquished by: (signature) <u>Sherry Moore</u> Date/Time <u>10-3-07 / 1700</u> | Received by: (signature) <u>Mike W. / Mike W.</u> Date/Time <u>10/4/07 08:35</u> | Notes: |
| Relinquished by: (signature) _____ Date/Time _____                               | Received by: (signature) _____ Date/Time _____                                   |        |
| Relinquished by: (signature) _____ Date/Time _____                               | Received by: (signature) _____ Date/Time _____                                   |        |

|              |                           |                                  |                      |                       |  |                             |
|--------------|---------------------------|----------------------------------|----------------------|-----------------------|--|-----------------------------|
| Lab Use Only | Shipper Name <u>Fel-X</u> | Air Bill # <u>8632 0816 8176</u> | Temp. (°C) <u>NA</u> | Condition <u>Good</u> | Custody Seals Intact? <u>Yes</u> <input checked="" type="checkbox"/> No <input type="checkbox"/> None <input type="checkbox"/> | Work Order # <u>0710142</u> |
|--------------|---------------------------|----------------------------------|----------------------|-----------------------|--|-----------------------------|



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Page 1 of 1

Project Manager John V. Cook  
 Collected by: (Print and Sign) Sherry Moore  
 Company URS Corp Email \_\_\_\_\_  
 Address 1001 Highland Plaza City St. Louis State MO Zip 63110  
 Phone 314-429-0100 Fax 314-429-0462

|                           |  |                                   |
|---------------------------|--|-----------------------------------|
| Project Info:             | Turn Around Time:                          | Lab Use Only                      |
| P.O. # _____              | <input checked="" type="checkbox"/> Normal | Pressurized by: <u>VPR</u>        |
| Project # <u>21501683</u> | <input type="checkbox"/> Rush              | Date: <u>10/5/07</u>              |
| Project Name _____        | Specify _____                              | Pressurization Gas: <u>(N) He</u> |

[illegible]

|  |  |  |  |        |
|--|--|--|--|--------|
| Relinquished by: (signature) Date/Time<br><i>Andy Mon 10:20 1/20</i> |  | Received by: (signature) Date/Time<br><i>James E. Wilentz 1/20 08:35</i> |  | Notes: |
| Relinquished by: (signature) Date/Time                               |  | Received by: (signature) Date/Time                                       |  |        |
| Relinquished by: (signature) Date/Time                               |  | Received by: (signature) Date/Time                                       |  |        |

|              |              |              |           |           |                       |                       |
|--------------|--------------|--------------|-----------|-----------|-----------------------|-----------------------|
| Lab Use Only | Shipper Name | Air Bill #   | Temp (°C) | Condition | Custody Seals Intact? | Work Order #          |
|              | FCM          | 8632 CHL 876 | NA        | Good      | Yes No <u>None</u>    | 0710142 AS<br>0710169 |

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/15/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0710169  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

No analytes required qualification based on this data review.

## Field IDs:

|            |        |
|------------|--------|
| VI-7-B     | VI-7-A |
| VI-7-C     | VI-8-A |
| VI-7-C DUP | VI-7-D |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL                      10% to LCL                      < 10%  |     |    |    |
|     | Positive                      J                      J                      J                                   |     |    |    |
|     | Non-detect                      None                      UJ                      R                             |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| Internal Standard Areas (QC 1) |  | Yes         | No          | NA |
|--------------------------------|--|-------------|-------------|----|
| 10.1                           | Are internal standard areas for every sample and blank within upper and lower QC limits?   | x           |             |    |
|                                | Area > +100%   | Area < -50% | Area < -10% |    |
|                                | Positive J   | J           | J           |    |
|                                | Non-detect None  | UJ          | R           |    |
| Note:                          | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |             |             |    |
| 10.2                           | Are retention times of internal standards within 30 seconds of the associated calibration standard?  | x           |             |    |
|                                | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |             |             |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  | x   |    |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  | x   |    |    |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Sample VI-7-C DUP was a field duplicate of sample VI-7-C. Both samples were analyzed for TO-15 Full Scan and Oxygen.

**14.0 Data Completeness**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x   |    |    |
| 14.2 | Number of samples:  |     |    |    |
| 14.3 | Number of target compounds in each analysis   |     |    |    |
| 14.4 | Number of results rejected and not reported   |     |    |    |
|      | % Completeness = 100 x ((14.1 * 14.2) - 14.3) / (14.1 * 14.2)   |     |    |    |
|      | % Completeness  |     |    |    |
|      |   | 100 |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/15/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0710142  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

No analytes required qualification based on this data review.

## Field IDs:

|        |
|--------|
| VI-9-A |
| VI-9-B |
| VI-9-C |
| VI-8-C |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.



### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     |    | x  |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL                      10% to LCL                      < 10%  |     |    |    |
|     | Positive                      J                      J                      J                                   |     |    |    |
|     | Non-detect                      None                      UJ                      R                             |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

|       |  | Yes         | No          | NA |
|-------|--|-------------|-------------|----|
| 10.1  | Are internal standard areas for every sample and blank within upper and lower QC limits?   | x           |             |    |
|       | Area > +100%   | Area < -50% | Area < -10% |    |
|       | Positive J   | J           | J           |    |
|       | Non-detect None  | UJ          | R           |    |
| Note: | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |             |             |    |
| 10.2  | Are retention times of internal standards within 30 seconds of the associated calibration standard?  | x           |             |    |
|       | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |             |             |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x   |    |    |
| 14.2 | Number of samples:  |     |    |    |
| 14.3 | Number of target compounds in each analysis   |     |    |    |
| 14.4 | Number of results rejected and not reported   |     |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |     |    |    |
|      | % Completeness  | 100 |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/15/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0710035  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

No analytes required qualification based on this data review.

## Field IDs:

|          |
|----------|
| VI-10-B1 |
| VI-10-C1 |
| VI-6-B1  |
| VI-6-C1  |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

## 10.0 Internal Standards (Code I)

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 10.1 | Are internal standard areas for every sample and blank within upper and lower QC limits?                 | x   |    |    |
|      | Area > +100% Area < -50% Area < -10%   |     |    |    |
|      | Positive J J J   |     |    |    |
|      | Non-detect None UJ R   |     |    |    |
|      | Note: The method specification is for the continuing calibration to be compared to the mid-point initial |     |    |    |
| 10.2 | Are retention times of internal standards within 30 seconds of the associated calibration standard?      | x   |    |    |
|      | Action: The chromatogram must be examined to determine if any false positives or negatives exist. For    |     |    |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

| 11.0 TCL Identification (Code W) |  | Yes | No | NA |
|----------------------------------|--|-----|----|----|
| 11.1                             | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2                             | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

| 12.0 TCL/TIC Quantitation and Reported Detection limits (Code K) |  | Yes | No | NA |
|--|--|-----|----|----|
| 12.1   | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2   | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3   | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4   | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5   | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

| 13.0 Field Duplicate Samples (Code F) |   | Yes | No | NA |
|---------------------------------------|---|-----|----|----|
| 13.1                                  | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2                                  | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|                                       | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

#### 14.0 Data Completeness

|      |   | Yes        | No | NA |
|------|---|------------|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x          |    |    |
| 14.2 | Number of samples:  |            |    |    |
| 14.3 | Number of target compounds in each analysis   |            |    |    |
| 14.4 | Number of results rejected and not reported   |            |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |            |    |    |
|      | <b>% Completeness</b>   | <b>100</b> |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/14/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709647  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

Samples were qualified "U" due to field blank contamination.

## Field IDs:

|              |
|--------------|
| VI-11-A      |
| VI-11-A DUP  |
| VI-13-A      |
| VI-092807-FB |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: The laboratory case narrative and cooler receipt form did not indicate any problems.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.



### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   | x   |    |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: Field Blank VI-092807-FB had detections of the following analytes (in µg/m<sup>3</sup>): Ethanol (1.6), Acetone (11), 2-Butanone (6.4), Benzene (0.61), Toluene (2.1), m,p-Xylene (1.2) and Oxygen (20%). Professional judgment was used to not qualify Oxygen due to the fact it is naturally occurring in air.

Analytes that required qualification due to field blank detections are located in the table below:

| Field ID | Analyte(s) | Qualification | Code | Batch # | Justification             |
|----------|------------|---------------|------|---------|---------------------------|
| VI-11-A  | Acetone    | U             | X    | y100926 | Field Blank contamination |
| VI-11-A  | 2-Butanone | U             | X    | y100926 | Field Blank contamination |
| VI-11-A  | m&p-Xylene | U             | X    | y100926 | Field Blank contamination |
| VI-13-A  | 2-Butanone | U             | X    | y100926 | Field Blank contamination |
| VI-13-A  | Benzene    | U             | X    | y100926 | Field Blank contamination |
| VI-13-A  | m&p-Xylene | U             | X    | y100926 | Field Blank contamination |

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

## 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

**9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)**

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   |     | x  |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: The LCS for TO-15 Full Scan had a LCS recovery (171%) outside of evaluation criteria (70-130%). All associated samples were non-detect. No qualification of data was required.

**10.0 Internal Standards (Code I)**

|       |  | Yes | No | NA |
|-------|--|-----|----|----|
| 10.1  | Are internal standard areas for every sample and blank within upper and lower QC limits?   | x   |    |    |
|       | Area > +100%      Area < -50%      Area < -10%   |     |    |    |
|       | Positive      J      J      J  |     |    |    |
|       | Non-detect      None      UJ      R  |     |    |    |
| Note: | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |     |    |    |
| 10.2  | Are retention times of internal standards within 30 seconds of the associated calibration standard?  | x   |    |    |
|       | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |     |    |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

| 12.0 TCL/TIC Quantitation and Reported Detection limits (Code K) |  | Yes | No | NA       |
|--|--|-----|----|----------|
| 12.1   | Are RLs used consistent with those specified in the QAPP   |     |    | <b>x</b> |
| 12.2   | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | <b>x</b> |
| 12.3   | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | <b>x</b> |
| 12.4   | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | <b>x</b> |
| 12.5   | If Level IV, calculate a sample of positive results to verify correct calculatic                     |     |    | <b>x</b> |

Note:

| 13.0 Field Duplicate Samples (Code F) |   | Yes      | No | NA |
|---------------------------------------|---|----------|----|----|
| 13.1                                  | Were any field duplicates submitted for VOC analysis  | <b>x</b> |    |    |
| 13.2                                  | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  | <b>x</b> |    |    |
|                                       | Action: No qualifying action is taken based on field duplicate results, however the data validator shou provide a qualitative assessment in the data validation report. |          |    |    |

Note: Sample VI-11-A DUP was a field duplicate of sample VI-11-A

#### 14.0 Data Completeness

|      |  |            | Yes      | No | NA |
|------|--|------------|----------|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous sampl |            | <b>x</b> |    |    |
| 14.2 | Number of samples:   | 4          |          |    |    |
| 14.3 | Number of target compounds in each analysis  | 60         |          |    |    |
| 14.4 | Number of results rejected and not reported  | 0          |          |    |    |
|      | % Completeness = $100 \times ((14.1 * 14.2) - 14.3) / (14.1 * 14.2)$                                 |            |          |    |    |
|      | <b>% Completeness</b>  | <b>100</b> |          |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/14/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709608  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

No analytes required qualification based on this data review.

## Field IDs:

VI-10-D

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL                      10% to LCL                      < 10%  |     |    |    |
|     | Positive                      J                      J                      J                                   |     |    |    |
|     | Non-detect                      None                      UJ                      R                             |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| Internal Standard Areas (QC 1) |  | Yes         | No          | NA |
|--------------------------------|--|-------------|-------------|----|
| 10.1                           | Are internal standard areas for every sample and blank within upper and lower QC limits?   | x           |             |    |
|                                | Area > +100%   | Area < -50% | Area < -10% |    |
|                                | Positive J   | J           | J           |    |
|                                | Non-detect None  | UJ          | R           |    |
| Note:                          | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |             |             |    |
| 10.2                           | Are retention times of internal standards within 30 seconds of the associated calibration standard?  | x           |             |    |
|                                | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |             |             |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   | Yes        | No | NA |
|------|---|------------|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x          |    |    |
| 14.2 | Number of samples:  |            |    |    |
| 14.3 | Number of target compounds in each analysis   |            |    |    |
| 14.4 | Number of results rejected and not reported   |            |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |            |    |    |
|      | <b>% Completeness</b>   | <b>100</b> |    |    |

Note:



# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/14/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709576  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

No analytes required qualification based on this data review.

## Field IDs:

|         |
|---------|
| VI-10-A |
| VI-6-A  |
| VI-12-A |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: The laboratory case narrative and cooler receipt form did not indicate any problems.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     |    | x  |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| Internal Standard Areas (QC 1) |   | Yes         | No          | NA |
|--------------------------------|---|-------------|-------------|----|
| 10.1                           | Are internal standard areas for every sample and blank within upper and lower QC limits?  | x           |             |    |
|                                | Area > +100%  | Area < -50% | Area < -10% |    |
|                                | Positive J  | J           | J           |    |
|                                | Non-detect None   | UJ          | R           |    |
| Note:                          | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.            |             |             |    |
| 10.2                           | Are retention times of internal standards within 30 seconds of the associated calibration standard?   | x           |             |    |
|                                | Action: The chromatogram must be examined to determine if any false positives or negatives exist. F shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |             |             |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x   |    |    |
| 14.2 | Number of samples:  |     |    |    |
| 14.3 | Number of target compounds in each analysis   |     |    |    |
| 14.4 | Number of results rejected and not reported   |     |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |     |    |    |
|      | % Completeness  | 100 |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/15/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709576  
**Review Level:** Level IV

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

Samples were qualified "J/UJ" due to Initial and Continuing Calibration %RSDs and %Ds outside of evaluation criteria.

## Field IDs:

|         |
|---------|
| VI-10-A |
| VI-6-A  |
| VI-12-A |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: The laboratory case narrative and cooler receipt form did not indicate any problems.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     | x   |    |    |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    | x   |    |    |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. | x   |    |    |

Note: All instrument performance check criteria were met.

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     |    | x  |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   | x   |    |    |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  | x   |    |    |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <30% or >0.990?  |     | x  |    |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     | x  |    |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   | x   |    |    |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  | x   |    |    |

Note: For TO-15 Full Scan, all analytes had a %RSD < 30%, with the exception of 1,2-Dichlorobenzene (31%) in data package 0709576A, alpha-Chlorotoluene and MTBE (38%) in data package 0709576D, Qualifications based on ICAL %RSD are located in the table below:

| Field ID | Analyte(s)              | Qualification | Code | Batch #   | Justification  |
|----------|-------------------------|---------------|------|-----------|----------------|
| VI-12-A  | 1,2-Dichlorobenzene     | J             | C    | t14l0921b | ICAL %RSD >30% |
| VI-10-A  | alpha-Chlorotoluene     | UJ            | C    | t14q928b  | ICAL %RSD >30% |
| VI-10-A  | Methyl tert-butyl ether | UJ            | C    | t14q928b  | ICAL %RSD >30% |
| VI-6-A   | alpha-Chlorotoluene     | UJ            | C    | t14q928b  | ICAL %RSD >30% |
| VI-6-A   | Methyl tert-butyl ether | UJ            | C    | t14q928b  | ICAL %RSD >30% |

## 6.0 Continuing Calibration (Code C)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?   | x   |    |    |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?  | x   |    |    |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.  | x   |    |    |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D <30%)? | x   |    |    |
|     | If yes, a marginal increase in response >30% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                      |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).   |     | x  |    |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.   | x   |    |    |

Note: For TO-15 Full Scan, all analytes had a %D < 30%, with the exception of Ethanol (40%) and Methyl tert-butyl ether (33%) for data package 0709576A. In data package 0709576D, 2-Butanone (33%) and alpha-Chlorotoluene (36%) had %D > 30%. Qualifications based on CCAL %D are located in the table below. The compound alpha-chlorotoluene was previously qualified due to initial calibration in samples VI-10-A and VI-6-A, no additional qualification of data was required.

| Field ID | Analyte(s)              | Qualification | Code | Batch #   | Justification |
|----------|-------------------------|---------------|------|-----------|---------------|
| VI-12-A  | Ethanol                 | UJ            | C    | t14i0921b | CCAL %D >30%  |
| VI-12-A  | Methyl tert-butyl ether | UJ            | C    | t14i0921b | CCAL %D >30%  |
| VI-10-A  | 2-Butanone              | J             | C    | t14q928b  | CCAL %D >30%  |
| VI-6-A   | 2-Butanone              | UJ            | C    | t14q928b  | CCAL %D >30%  |

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes        | No    | NA |
|-----|---|------------|-------|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x          |       |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x          |       |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |            |       | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |            |       | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |            |       |    |
|     | > UCL   | 10% to LCL | < 10% |    |
|     | Positive J  | J          | J     |    |
|     | Non-detect None   | UJ         | R     |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     |    | x  |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

**9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)**

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   | x   |    |    |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| Are internal standard areas (QC 1) |  |      |             | Yes         | No | NA |
|------------------------------------|--|------|-------------|-------------|----|----|
| 10.1                               | Are internal standard areas for every sample and blank within upper and lower QC limits?   |      |             | x           |    |    |
|                                    | Area > +100%   |      | Area < -50% | Area < -10% |    |    |
|                                    | Positive   | J    | J           | J           |    |    |
|                                    | Non-detect   | None | UJ          | R           |    |    |
| Note:                              | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |      |             |             |    |    |
| 10.2                               | Are retention times of internal standards within 30 seconds of the associated calibration standard?  |      |             | x           |    |    |
|                                    | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |      |             |             |    |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  | x   |    |    |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? | x   |    |    |

Note: All criteria were met.

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   | x   |    |    |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   | x   |    |    |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     | x  |    |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    | x   |    |    |

Note: All criteria were met.



| 13.0 Field Duplicate Samples (Code F) |   | Yes | No | NA |
|---------------------------------------|---|-----|----|----|
| 13.1                                  | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2                                  | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|                                       | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |
| Note:                                 | Field duplicate samples were not submitted for analysis.  |     |    |    |

#### 14.0 Data Completeness

|       |   |     | Yes | No | NA |
|-------|---|-----|-----|----|----|
| 14.1  | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) |     | x   |    |    |
| 14.2  | Number of samples:  | 3   |     |    |    |
| 14.3  | Number of target compounds in each analysis   | 60  |     |    |    |
| 14.4  | Number of results rejected and not reported   | 0   |     |    |    |
|       | % Completeness = 100 x ((14.1 * 14.2) - 14.3) / (14.1 * 14.2)   |     |     |    |    |
|       | % Completeness  | 100 |     |    |    |
| Note: |   |     |     |    |    |

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/14/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709557  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

Samples were qualified "U" due to field blank contamination. Samples were also qualified "J" due to high surrogate recovery.

## Field IDs:

|              |
|--------------|
| VI-5-A       |
| VI-5-B       |
| VI-5-C       |
| VI-092507-FB |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: The laboratory case narrative indicated surrogate recovery was outside evaluation criteria for TO-15 full scan and TO-15 SIM. No other issues were noted in the case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: Field Blank VI-092507-FB had detections of the following analytes (in µg/m<sup>3</sup>): Ethanol (1.8), Acetone (13), 2-Butanone (10), Benzene (0.58), Toluene (2.0), m,p-Xylene (1.4), o-Xylene (0.70), 4-Ethyltoluene (0.98), and 1,2,4-Trimethylbenzene (1.5).

Analytes that required qualification due to Field Blank detections are located in the table below:

| Field ID | Analyte(s)             | Qualification | Code | Batch #   | Justification             |
|----------|------------------------|---------------|------|-----------|---------------------------|
| VI-5-A   | m&p-Xylene             | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-A   | 4-Ethyltoluene         | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-B   | 2-Butanone             | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-C   | 2-Butanone             | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-C   | m&p-Xylene             | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-C   | o-Xylene               | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-C   | 4-Ethyltoluene         | U             | X    | t14i0921b | Field Blank contamination |
| VI-5-C   | 1,2,4-Trimethylbenzene | U             | X    | t14i0921b | Field Blank contamination |

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

## 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?  | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?   |     | x  |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?  |     | x  |    |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.)                              |     | x  |    |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted samples, then no reanalysis is required. |     |    |    |
|     | > UCL 10% to LCL < 10%   |     |    |    |
|     | Positive J J J   |     |    |    |
|     | Non-detect None UJ R   |     |    |    |

Note: In sample VI-5-C, the surrogate 1,2-Dichloroethane-d4 had a recovery (193%) outside of evaluation criteria (70-130%) in both full scan and SIM.

Analytes that required qualification due to surrogate recovery are located in the table below:

| Field ID | Analyte(s)                     | Qualification | Code | Batch # | Justification           |
|----------|--------------------------------|---------------|------|---------|-------------------------|
| VI-5-C   | All TO-15 full scan detections | J             | S    | y100315 | High surrogate recovery |
| VI-5-C   | All TO-15 SIM detections       | J             | S    | a100410 | High surrogate recovery |

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

**9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)**

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| Are internal standard areas (QC 1) |  |      |             | Yes         | No | NA |
|------------------------------------|--|------|-------------|-------------|----|----|
| 10.1                               | Are internal standard areas for every sample and blank within upper and lower QC limits?   |      |             | x           |    |    |
|                                    | Area > +100%   |      | Area < -50% | Area < -10% |    |    |
|                                    | Positive   | J    | J           | J           |    |    |
|                                    | Non-detect   | None | UJ          | R           |    |    |
| Note:                              | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |      |             |             |    |    |
| 10.2                               | Are retention times of internal standards within 30 seconds of the associated calibration standard?  |      |             | x           |    |    |
|                                    | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |      |             |             |    |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   |     | Yes | No | NA |
|------|---|-----|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) |     | x   |    |    |
| 14.2 | Number of samples:  | 4   |     |    |    |
| 14.3 | Number of target compounds in each analysis   | 60  |     |    |    |
| 14.4 | Number of results rejected and not reported   | 0   |     |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |     |     |    |    |
|      | % Completeness  | 100 |     |    |    |

Note:

**DATA VALIDATION WORKSHEET  
VOLATILE ORGANIC ANALYSIS**

**Reviewer:** Steve Gragert  
**Date:** 11/14/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709528  
**Review Level:** Level III

**Major Anomalies:**

No samples were rejected

**Minor Anomalies:**

Samples were qualified "J/UJ" due to low LCS recovery.

**Field IDs:**

|        |            |
|--------|------------|
| VI-3-B | VI-4-D     |
| VI-3-C | VI-4-E     |
| VI-4-C | VI-4-C DUP |

**1.0 Chain of Custody/Sample Condition**

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

**2.0 Holding Time/ Preservation (Code H)**

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     |    | x  |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: All blank criteria were met.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:



## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples <i>from the same site/matrix</i> . Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   |     | x  |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: Dichlorodifluoromethane (Freon 12) had a LCS recovery (62%) outside of evaluation criteria (70-130%). Analytes that required qualification due to LCS recoveries are located in the table below:

| Field ID   | Analyte(s) | Qualification | Code | Batch #   | Justification    |
|------------|------------|---------------|------|-----------|------------------|
| VI-3-B     | Freon 12   | J             | L    | t1410921b | Low LCS recovery |
| VI-3-C     | Freon 12   | UJ            | L    | t1410921b | Low LCS recovery |
| VI-4-C     | Freon 12   | J             | L    | t1410921b | Low LCS recovery |
| VI-4-C DUP | Freon 12   | J             | L    | t1410921b | Low LCS recovery |
| VI-4-D     | Freon 12   | UJ            | L    | t1410921b | Low LCS recovery |
| VI-4-E     | Freon 12   | UJ            | L    | t1410921b | Low LCS recovery |

**10.0 Internal Standards (Code I)**

|       |  | Yes         | No          | NA |
|-------|--|-------------|-------------|----|
| 10.1  | Are internal standard areas for every sample and blank within upper and lower QC limits?   | x           |             |    |
|       | Area > +100%   | Area < -50% | Area < -10% |    |
|       | Positive J   | J           | J           |    |
|       | Non-detect None  | UJ          | R           |    |
| Note: | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.             |             |             |    |
| 10.2  | Are retention times of internal standards within 30 seconds of the associated calibration standard?  | x           |             |    |
|       | Action: The chromatogram must be examined to determine if any false positives or negatives exist. If shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |             |             |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  | x   |    |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  | x   |    |    |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Sample VI-4-C-DUP was the field duplicate for sample VI-4-C.

**14.0 Data Completeness**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x   |    |    |
| 14.2 | Number of samples:  |     |    |    |
| 14.3 | Number of target compounds in each analysis   |     |    |    |
| 14.4 | Number of results rejected and not reported   |     |    |    |
|      | % Completeness = $100 \times ((14.1 * 14.2) - 14.3) / (14.1 * 14.2)$                                    |     |    |    |
|      | % Completeness  |     |    |    |
|      |   | 100 |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/13/2007  
**Laboratory:** Severn Trent Laboratory - Savannah

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709494  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

Samples were qualified "J/UJ" due to low LCS recovery.

## Field IDs:

|              |
|--------------|
| VI-4-A       |
| VI-4-B       |
| VI-092107-FB |
| VI-3-A       |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  |     | x  |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: The laboratory case narrative indicated the COC was not signed by the field sampler. Chain of custody was not relinquished properly. URS was notified of the discrepancy. The laboratory indicated the cooler arrived with custody seals intact and all samples were received in good condition. No qualification of data was required. No other issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirement?   | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non-detects "R". |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-).   |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)?     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag R.    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag R. |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch?   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)?   |     | x  |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported.   |     |    | x  |

Note: Field Blank VI-092107-FB had a detection of Oxygen (20%). Professional judgment was used to not qualify Oxygen due to the fact it is naturally occurring in the air.

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument used?  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990?  |     |    | x  |
|     | If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R".   |     |    |    |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use 0.01 for poor responders like ketones or alcohols)? If yes, J(+)/R(-). |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL.   |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being made.  |     |    | x  |

Note:

### 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete?  |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours?   |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4.   |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and continuing calibration RRF outside QC limits (%D < 20%)? |     |    | x  |
|     | If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). For %D > 50%, flag R.                                       |     |    |    |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-).  |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculations.  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                                     | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?                      | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                                       |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be diluted out.) |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or diluted             |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present?   |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix. Recoveries <10% may require rejection. RPD failures may be flagged "J" (+ only) |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

## 9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   |     | x  |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: Dichlorodifluoromethane (Freon 12) had a LCS recovery (62%) outside of evaluation criteria (70-130%). Analytes that required qualification due to LCS recoveries are located in the table below:

| Field ID | Analyte(s) | Qualification | Code | Batch #   | Justification    |
|----------|------------|---------------|------|-----------|------------------|
| VI-4-A   | Freon 12   | UJ            | L    | t1410921b | Low LCS recovery |
| VI-4-B   | Freon 12   | UJ            | L    | t1410921b | Low LCS recovery |
| VI-3-A   | Freon 12   | J             | L    | t1410921b | Low LCS recovery |

**10.0 Internal Standards (Code I)**

|       |   | Yes | No | NA |
|-------|---|-----|----|----|
| 10.1  | Are internal standard areas for every sample and blank within upper and lower QC limits?  | x   |    |    |
|       | Area > +100%                      Area < -50%                      Area < -10%  |     |    |    |
|       | Positive                      J                      J                      J   |     |    |    |
|       | Non-detect                      None                      UJ                      R   |     |    |    |
| Note: | calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual samples in this case.            |     |    |    |
| 10.2  | Are retention times of internal standards within 30 seconds of the associated calibration standard?   | x   |    |    |
|       | Action: The chromatogram must be examined to determine if any false positives or negatives exist. F shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction. |     |    |    |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?  |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the sample mass spectrum; and do sample and standard relative ion intensities agree within 30%? |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP   |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required?                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum? |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J".    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculation                    |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?  |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validator should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous samples) | x   |    |    |
| 14.2 | Number of samples:  |     |    |    |
| 14.3 | Number of target compounds in each analysis   |     |    |    |
| 14.4 | Number of results rejected and not reported   |     |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                          |     |    |    |
|      | % Completeness  | 100 |    |    |

Note:

# DATA VALIDATION WORKSHEET VOLATILE ORGANIC ANALYSIS

**Reviewer:** Steve Gragert  
**Date:** 11/13/2007  
**Laboratory:** Air Toxics

**Project Name:** Sauget - Area 2 Air Sampling  
**Project Number:** 21561683.80012  
**SDG No.:** 0709432  
**Review Level:** Level III

## Major Anomalies:

No samples were rejected

## Minor Anomalies:

Samples were qualified "U" due to field blank contaminaton.

## Field IDs:

|              |
|--------------|
| VI-2-B       |
| VI-091907-FB |
| VI-2-D       |

## 1.0 Chain of Custody/Sample Condition

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 1.1 | Do Chain-of-Custody forms list all samples analyzed?   | x   |    |    |
| 1.2 | Are all Chain-of-Custody forms signed, indicating sample chain-of-custody was maintained?  | x   |    |    |
| 1.3 | Do the Traffic Reports, chain-of-custody, and lab narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? |     | x  |    |

Note: No issues were noted in the laboratory case narrative or cooler receipt forms.

## 2.0 Holding Time/ Preservation (Code H)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 2.1 | Do sample preservation, collection and storage condition meet method requirements?  | x   |    |    |
|     | If sample preservation and/or temperature was inappropriate (i.e., <2° >6°C, etc.), comment in report. If unpreserved or temperature is outside the range 0° (but not frozen) to 10° flag all positive results with a "J" and all non-detects "UJ". If temperature exceeds 10°, flag positive detections "J" and non- |     |    |    |
| 2.2 | Have any technical holding times, determined from sampling to date of analysis, been exceeded? If yes, J(+)/UJ(-).  |     | x  |    |
|     | Matrix Preserved Holding Time<br>Air No 14 days   |     |    |    |
| 2.3 | Have any technical holding times been grossly (twice the holding time) exceeded? If yes, J(+)/R(-)  |     | x  |    |

Note: All holding time criteria were met.

### 3.0 GC/MS Instrument Performance Check (Code T)

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 3.1 | Are GC/MS Tuning and Mass Calibration forms present for bromofluorobenzene (BFB)     |     |    | x  |
| 3.2 | Have all samples been analyzed within twelve hours of the BFB tune? If no, flag F    |     |    | x  |
| 3.3 | Have ion abundance criteria for BFB been met for each instrument used? If no, flag F |     |    | x  |

Note:

### 4.0 Blanks (Method Blanks, Field Blanks and Trip Blanks)

(Code X - Field Blank Contamination, Code Y - Trip blank contamination, Code Z - Method blank contamination)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 4.1 | Is a Method Blank Summary form present for each batch   | x   |    |    |
| 4.2 | Do any method blanks have positive VOA results (TCL and/or TIC)   |     | x  |    |
| 4.3 | Do any field/trip rinse/equipment blanks have positive VOA results (TCL and/or TIC)   | x   |    |    |
|     | Action: Positive sample results <5X (or 10X for common volatile lab contaminants- methylene chloride, acetone, and 2-butanone) the blank concentration should be qualified "U". The result should be elevated to the RL for estimate (laboratory "J" flagged) concentrations. |     |    |    |
| 4.4 | If Level IV, review raw data and verify all detections for blanks were reported   |     |    | x  |

Note: Field Blank VI-091907-FB had detections of the following analytes (in µg/m³): Chloromethane (0.32), Ethanol (2.8), Acetone (13), 2-Butanone (9.8), Benzene (0.51), Toluene (2.8), m,p-Xylene (2.4), 4-Ethyltoluene (0.85), 1,2,4-Trimethylbenzene (0.90), and Oxygen (20%). Professional judgment was used to not qualify Oxygen due to the fact it is naturally occurring in the air. Analytes that required qualification due to Field Blank detections are located in the table below:

| Field ID | Analyte(s)     | Qualification | Code | Batch #   | Justification             |
|----------|----------------|---------------|------|-----------|---------------------------|
| VI-2-D   | 4-Ethyltoluene | U             | X    | y092515.d | Field Blank contamination |
| VI-2-B   | 2-Butanone     | U             | X    | y092515.d | Field Blank contamination |
| VI-2-B   | Benzene        | U             | X    | y092515.d | Field Blank contamination |

### 5.0 GC/MS Initial Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 5.1 | Are Initial Calibration summary forms present and complete for each instrument use  |     |    | x  |
| 5.2 | Are CCCs linear applying either %RSD < 30% and all other compounds <15% or >0.990? If not, J(+)/ UJ(-). In extreme cases, the reviewer may flag non-detects "R" |     |    | x  |
| 5.3 | Do any SPCC compounds have an RRF less than specification or any other compounds < 0.05 (use  |     |    | x  |
| 5.4 | Is the lowest standard at the same concentration, or lower, as the RL reported? If not, elevate RL  |     |    | x  |
| 5.5 | If Level IV, recalculate a sample of RRFs and %RSDs to verify correct calculations are being mad  |     |    | x  |

Note:



## 6.0 Continuing Calibration (Code C)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 6.1 | Are Continuing Calibration Summary forms present and complete   |     |    | x  |
| 6.2 | Has a continuing calibration standard been analyzed every 12 hours  |     |    | x  |
| 6.3 | Have all SPCCs and CCCs met method specifications? If not, comment in report, proceed to 6.4  |     |    | x  |
| 6.4 | Do any compounds have a % difference (or % drift for quantitation from a curve) (%D) between initial and repeat analysis? If yes, a marginal increase in response >20% then J(+) only; a decrease in response then J(+)/ UJ(-). |     |    | x  |
| 6.5 | Do any compounds have an RRF < 0.05 (use 0.01 for poor responders)? If yes, J(+)/R(-)   |     |    | x  |
| 6.6 | If Level IV, calculate a sample of RFs and %Ds from ave RF to verify correct calculation  |     |    | x  |

Note:

## 7.0 Surrogate Recovery (Code S)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 7.1 | Are all samples listed on the appropriate Surrogate Recovery Summary Form ?                       | x   |    |    |
| 7.2 | Are surrogate recoveries within acceptance criteria specified in the QAPP for all samples?        | x   |    |    |
| 7.3 | If No in Section 7.2, were these sample(s) or method blank(s) reanalyzed?                         |     |    | x  |
| 7.4 | If No in Section 7.3, is any sample dilution factor greater than 10? (Surrogate recoveries may be |     |    | x  |
|     | Note: If SMC recoveries do not meet acceptance criteria in samples chosen for the MS/MSD or       |     |    |    |
|     | > UCL 10% to LCL < 10%  |     |    |    |
|     | Positive J J J  |     |    |    |
|     | Non-detect None UJ R  |     |    |    |

Note: All surrogate recoveries were within evaluation criteria.

## 8.0 Matrix Spike/Matrix Spike Duplicate (MS/MSD) or one MS with a Sample Duplicate (Recovery - Code M, RPD - Code D)

|     |   | Yes | No | NA |
|-----|---|-----|----|----|
| 8.1 | Is a Matrix Spike/Matrix Spike Duplicate recovery form present  |     | x  |    |
| 8.2 | Are MS/MSDs analyzed at the required frequency of one matrix spike per ten samples and a duplicate per twenty for each matrix?  |     |    | x  |
| 8.3 | Are all MS/MSD %Rs and RPDs within acceptance criteria Specified in the QAPP?   |     |    | x  |
|     | Using informed professional judgment, the data reviewer should use the MS and MSD results in conjunction with other QC criteria and determine the need for qualification of the data for samples from the same site/matrix . Recoveries <10% may require rejection. RPD failures may be flagged "J" |     |    |    |

Note: MS/MSD samples were not submitted for analysis.

**9.0 Laboratory Control Sample (LCS/LCSD) (Recovery - Code L, RPD - Code E)**

|     |  | Yes | No | NA |
|-----|--|-----|----|----|
| 9.1 | Is an LCS recovery form present?   | x   |    |    |
| 9.2 | Is an LCS analyzed at the required frequency of one per twenty field samples for each matrix?  | x   |    |    |
| 9.3 | Are all LCS %Rs and RPDs within acceptance criteria specified in the QAPP?   | x   |    |    |
| 9.4 | If Level IV, verify the % recoveries are calculated correctly.   |     |    | x  |
|     | Action for specific compound outside the acceptance criteria: %R>UCL, J(+) only; <LCL, J(+)/UJ(-); <30% J(+)/R(-). RPD failures should be flagged "J" (+ only) |     |    |    |

Note: All LCS recoveries were within evaluation criteria.

**10.0 Internal Standards (Code I)**

| 10.1 Internal Standards (Cont'd) |   |      |    | Yes | No | NA |   |
|----------------------------------|---|------|----|-----|----|----|---|
| 10.1                             | Are internal standard areas for every sample and blank within upper and lower QC limits?  |      |    | x   |    |    |   |
|                                  | Area > +100%                      Area < -50%                      Area < -10%  |      |    |     |    |    |   |
|                                  | Positive  | J    | J  |     |    |    | J |
|                                  | Non-detect  | None | UJ |     |    |    | R |
| Note:                            | The method specification is for the continuing calibration to be compared to the mid-point initial calibration, not sample to continuing calibration. Thus, if all other QC specifications are met for a given sample, using informed professional judgment, the reviewer may choose not to flag individual |      |    |     |    |    |   |
| 10.2                             | Are retention times of internal standards within 30 seconds of the associated calibration standard?   |      |    | x   |    |    |   |
|                                  | Action: The chromatogram must be examined to determine if any false positives or negatives exist. For shift of a large magnitude, the reviewer may consider partial or total rejection of the data for non-detects in that sample/fraction.   |      |    |     |    |    |   |

Note: Internal standard area counts and retention times were within evaluation criteria.

**11.0 TCL Identification (Code W)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 11.1 | Is the relative retention time (RRT) of each reported compound within 0.06 RRT units of the standard? |     |    | x  |
| 11.2 | Are the three ions of greatest intensity present in the standard mass spectrum also present in the    |     |    | x  |

Note:

**12.0 TCL/TIC Quantitation and Reported Detection limits (Code K)**

|      |   | Yes | No | NA |
|------|---|-----|----|----|
| 12.1 | Are RLs used consistent with those specified in the QAPP  |     |    | x  |
| 12.2 | Are these limits adjusted to reflect dilutions and/ or percent solids as required                   |     |    | x  |
| 12.3 | Are TIC ions greater than ten percent in the reference spectrum also present in the sample spectrum |     |    | x  |
| 12.4 | Are any positives reported that exceed the linear range of the instrument? If yes, than flag "J"    |     |    | x  |
| 12.5 | If Level IV, calculate a sample of positive results to verify correct calculations                  |     |    | x  |

Note:

**13.0 Field Duplicate Samples (Code F)**

|      |  | Yes | No | NA |
|------|--|-----|----|----|
| 13.1 | Were any field duplicates submitted for VOC analysis?  |     | x  |    |
| 13.2 | Were all RPD or absolute difference values within the control limits outlined in the QAPP?   |     |    | x  |
|      | Action: No qualifying action is taken based on field duplicate results, however the data validation should provide a qualitative assessment in the data validation report. |     |    |    |

Note: Field duplicate samples were not submitted for analysis.

**14.0 Data Completeness**

|      |   |            | Yes | No | NA |
|------|---|------------|-----|----|----|
| 14.1 | Is % completeness within the control limits? (Control limit: Check QAPP or use 95% for aqueous) |            | x   |    |    |
| 14.2 | Number of samples:  | 3          |     |    |    |
| 14.3 | Number of target compounds in each analysis   | 60         |     |    |    |
| 14.4 | Number of results rejected and not reported:  | 0          |     |    |    |
|      | % Completeness = $100 \times ((14.1 \times 14.2) - 14.3) / (14.1 \times 14.2)$                  |            |     |    |    |
|      | <b>% Completeness</b>   | <b>100</b> |     |    |    |

Note: